

TELECOM BUSINESS REVIEW

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From the Director's desk.

It gives me great pleasure in presenting to you the fourth issue of Telecom Business Review (**TBR**). The TBR has been a platform for scholars, teachers, professionals & students to contribute & showcase their knowledge, research, experience, study results & findings in the relevant areas of Technology & Business Management. In the 2010 issue of TBR we published articles on diverse topics like 3G spectrum auctions, MVAS, OSS/BSS, Low Utilisation Towns and MNP.

I am sure that this year's issue of the TBR will also help to trigger quality studies in field of telecom business management and enlighten and educate the telecom fraternity.

At the release of the fourth issue I thank all the contributors for their thought provoking articles. I also express my heartfelt gratitude to the members of the editorial board and all our esteemed reviewers. Through this publication I would like to invite more participation from the telecom fraternity in an effort to make the TBR global by contributing research papers that highlight global issues in telecom business.

Sunil Patil
Director, SITM

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Convergent Billing-The Roadmap Ahead

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Abstract:

Billing is just sending an invoice and collecting the payment. But the amount of work carried in the backdrop is stupendous. An efficient network infrastructure and good system integration is required to deploy an effective billing operations support system. The conventional bifurcation of mere prepaid and postpaid systems is a legacy now. A convergent solution should be capable of providing high-performance methods for any combination of payment methods and technologies utilized. Convergent Billing is a one-stop shop for multiple services and customers anticipate a single bill for all the services they use from a single service provider. In addition, a converged bill has the leverage of cross service discounting.

Operators today are pushing hard to move towards a converged platform. Most of the operators in India claim that their systems are ready to provide convergent solutions. However, today, different services are bundled together to be disguised as a Converged Solution, which in fact is not the case.

This paper aims to highlight details on the

- Evolution of the concept of Convergent Billing
- Significance of Convergent Billing from different view points
- Principles involved in the concept of Convergent Billing

At the best, the roadmap for a converged platform with respect to the Indian Telecom Industry would be highlighted vis-à-vis the Global Telecom Industry.

Introduction:

Telecom Convergent Charging and Billing (also known as convergent charging, converged charging and convergent billing), is a solution in the telecommunications industry that enables common management of all users and all services for operators. It includes convergence of payment methods like

prepaid and postpaid, as well as access methods and services like fixed telephony, mobile telephony, broadband and TV.

Need for convergence:

1. Network Migration

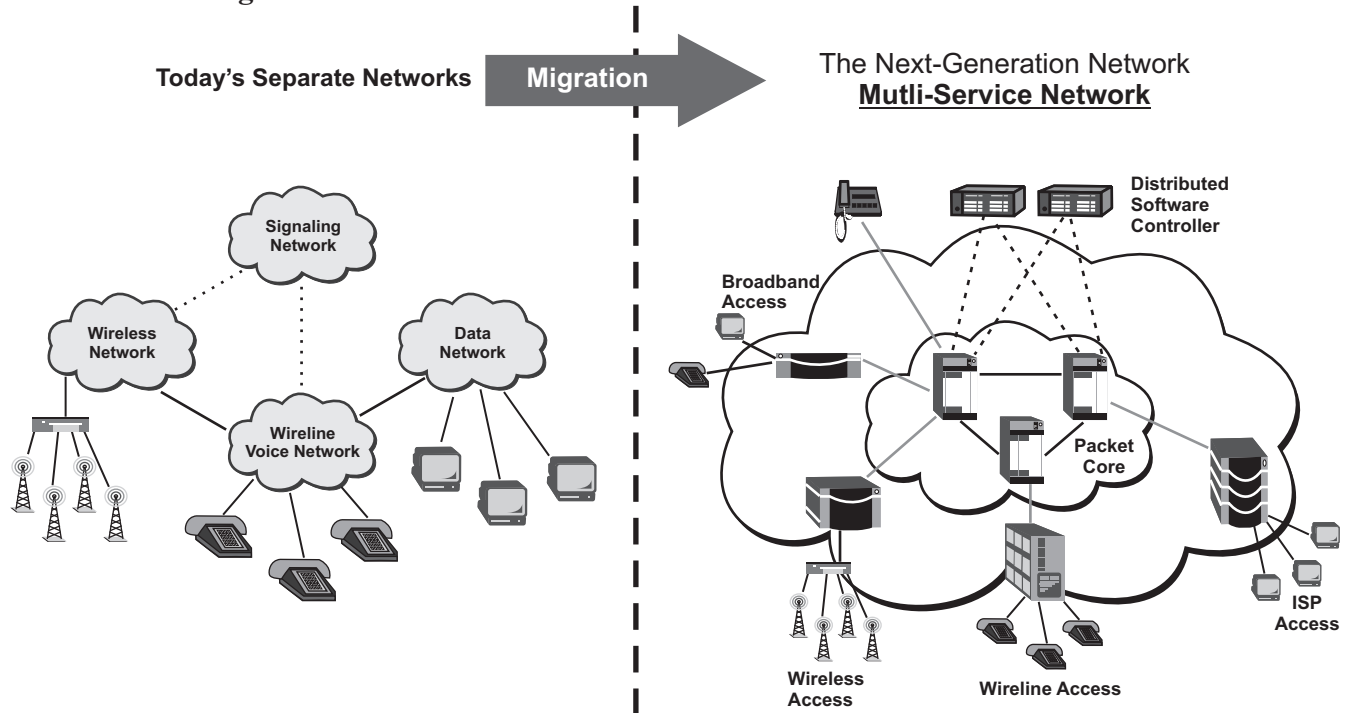


Figure 1: Network Migration

2. Demand for Services:

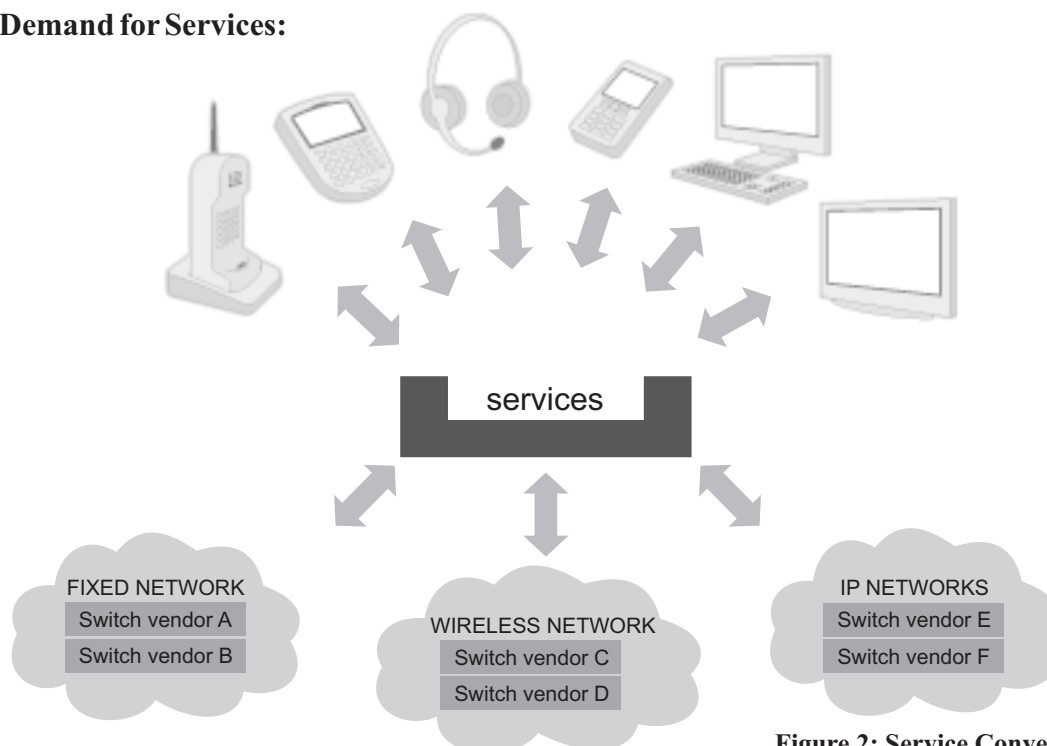


Figure 2: Service Convergence

3. Device Convergence:



Figure 3: Device Convergence

The concept of Convergent Billing is designed in such a manner so as to provide convergent support to each of the technologies shown below. Any of these services can be assigned to any one given account.

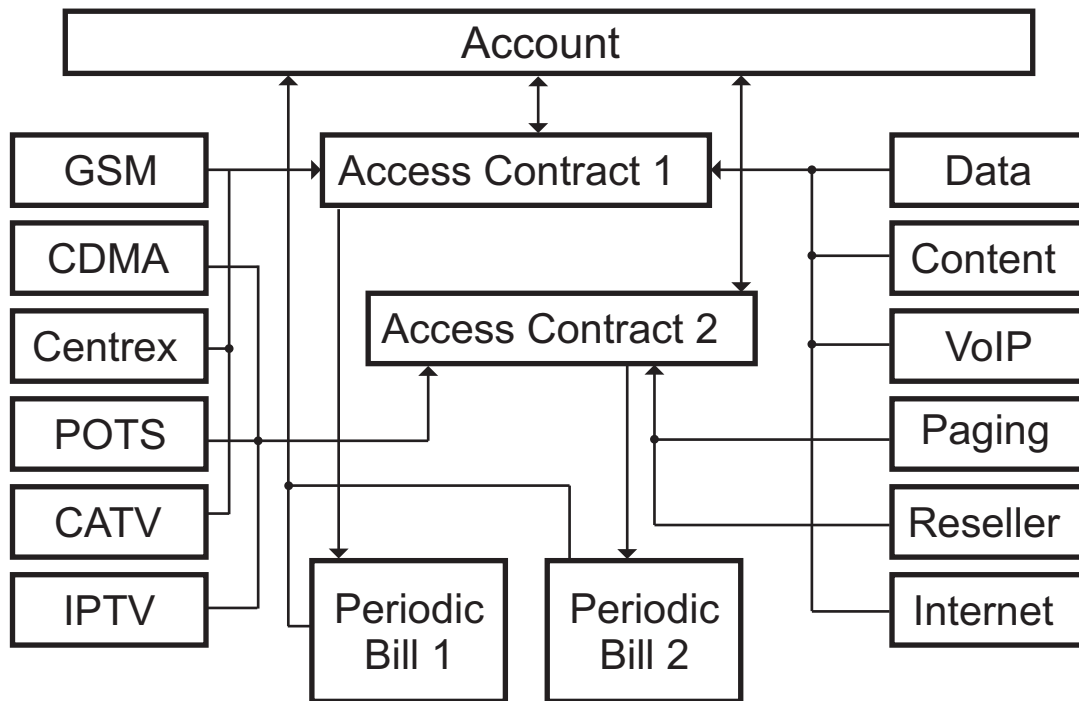


Figure 4: Technology Convergence and Billing

In addition to accommodating to a broad range of features and functions, true convergent services support means 'Converging with no restrictions' on how such services are grouped or billed.

3. Basic Functionality of Billing Systems:

Billing systems collect, rate, and calculate charges for the use of telecommunication services. The figure given below presents a simplistic view of a billing flow.

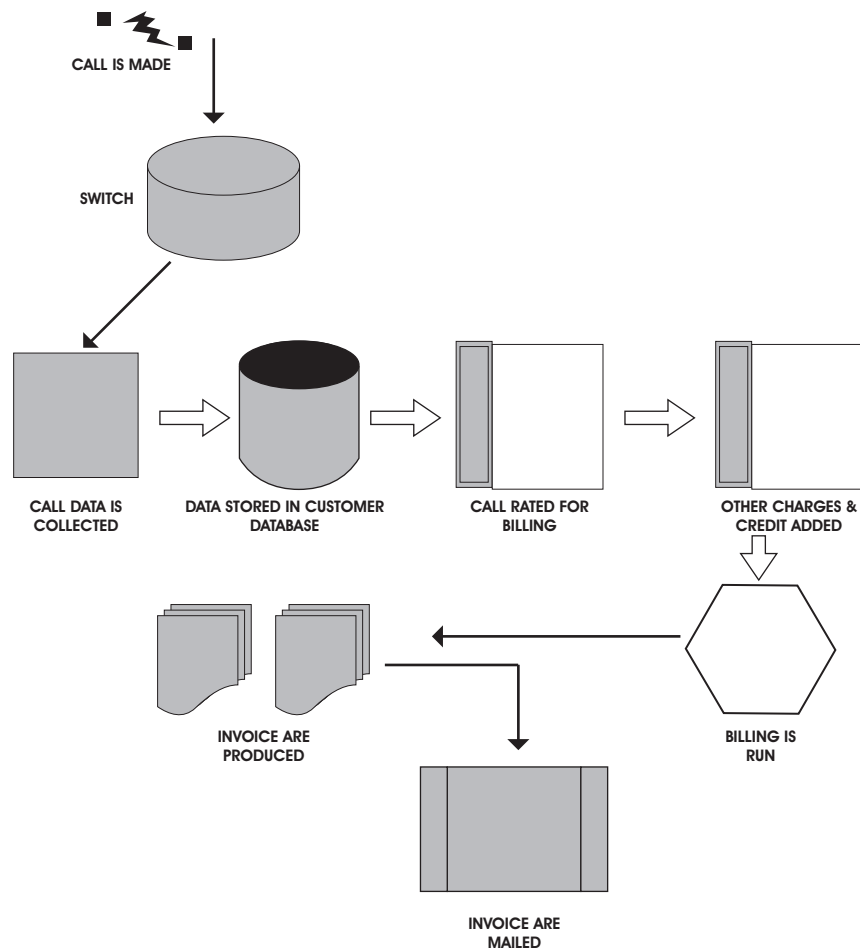


Figure 5: Billing Flow

The typical billing process involves collecting usage information from network equipment (such as switches), formatting the usage information into records that a billing system can understand, transferring these records to a Rating Engine, that assigns charges to each record, receiving and recording payments from the customers, and creating invoices.

The customer sends his payment to the telecom service provider. Payments are recorded (posted) in the financial system. Customer's bills are archived in "Billing History" files. These files are used heavily by various organizations within the enterprise: Customer Care (inquiries, adjustments, service order, etc.), Marketing (product analysis), Finance (revenue management, revenue projections, profitability, etc.), Audit, and Revenue Assurance.

4. Telecom Billing Transition

Many established operators have a mature billing environment, which may well be subject to review and upgrade with the change in network technology and services. As the prevailing service environment moves to IP transport, the billing environment will become IP-centric.

There are three principal options for an existing telecommunications operator to take when planning their BSS architecture transition from 2G, through 2.5G to 3G networks. These are:

- **Enhance existing platforms** - a relatively straightforward step change but one which may soon seem inadequate
- **Transition to all-IP billing platforms**, reflecting future network transition and optimizing around the IP network. But, this begs the question of which IP billing products are appropriate for a mobile internet provider (existing solutions have largely been designed for the fixed network dial-up ISP).
- **Move to a predominantly real time platform**, where calls can be rated while in progress and any further action needed during or immediately after the call or session, is not delayed by batch process.

Considered over time, elements of these approaches are likely to be mixed and matched. For the sake of illustration, this section considers a simple stepped approach.

STAGE 1: Minimal upgrade for rapid launch: Subscription and Volume based billing

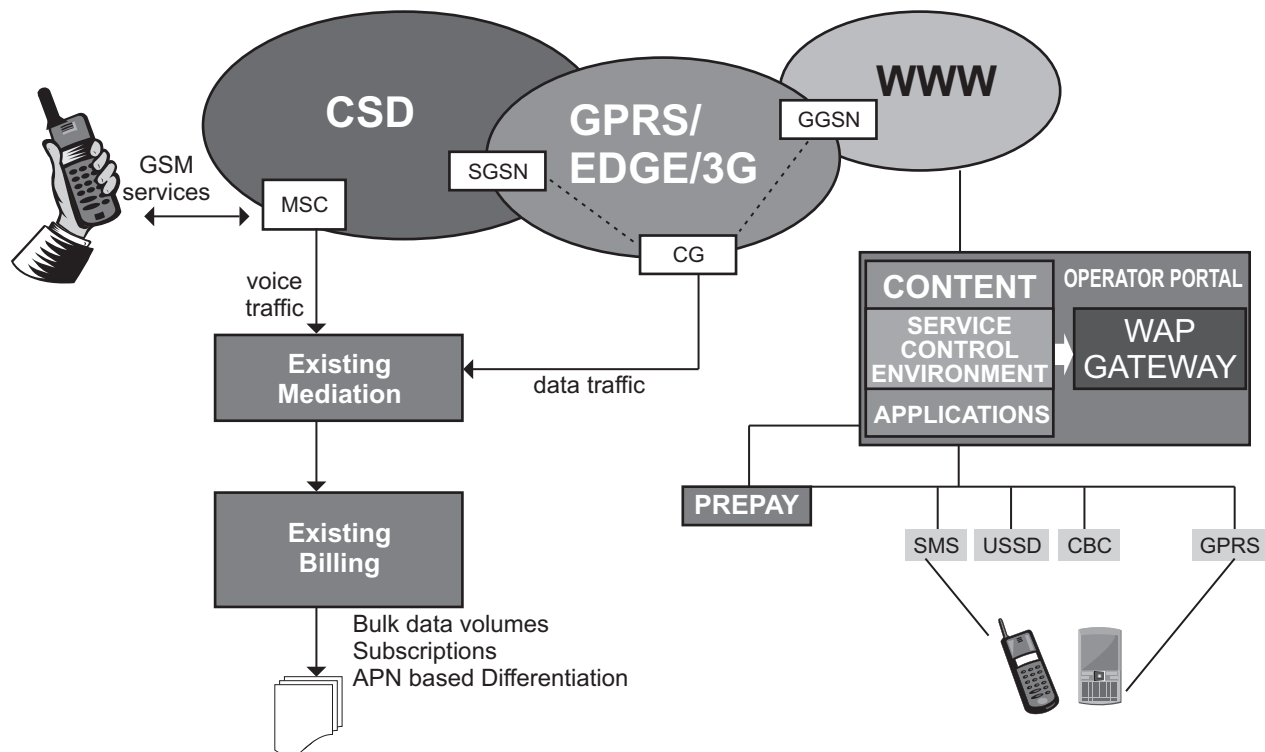


Figure 6: Conceptual Architecture - Rapid Launch

It is possible to begin providing service with relatively little effort. Initially work with the legacy system and generate bills for the basic services offered. CSD here refers to Circuit Switched Data. The mediation engine will collect the UDRs (User Data Records) from both Voice traffic and Data traffic and will send it to the billing system.

STAGE 2: Convergent voice and IP Service Billing

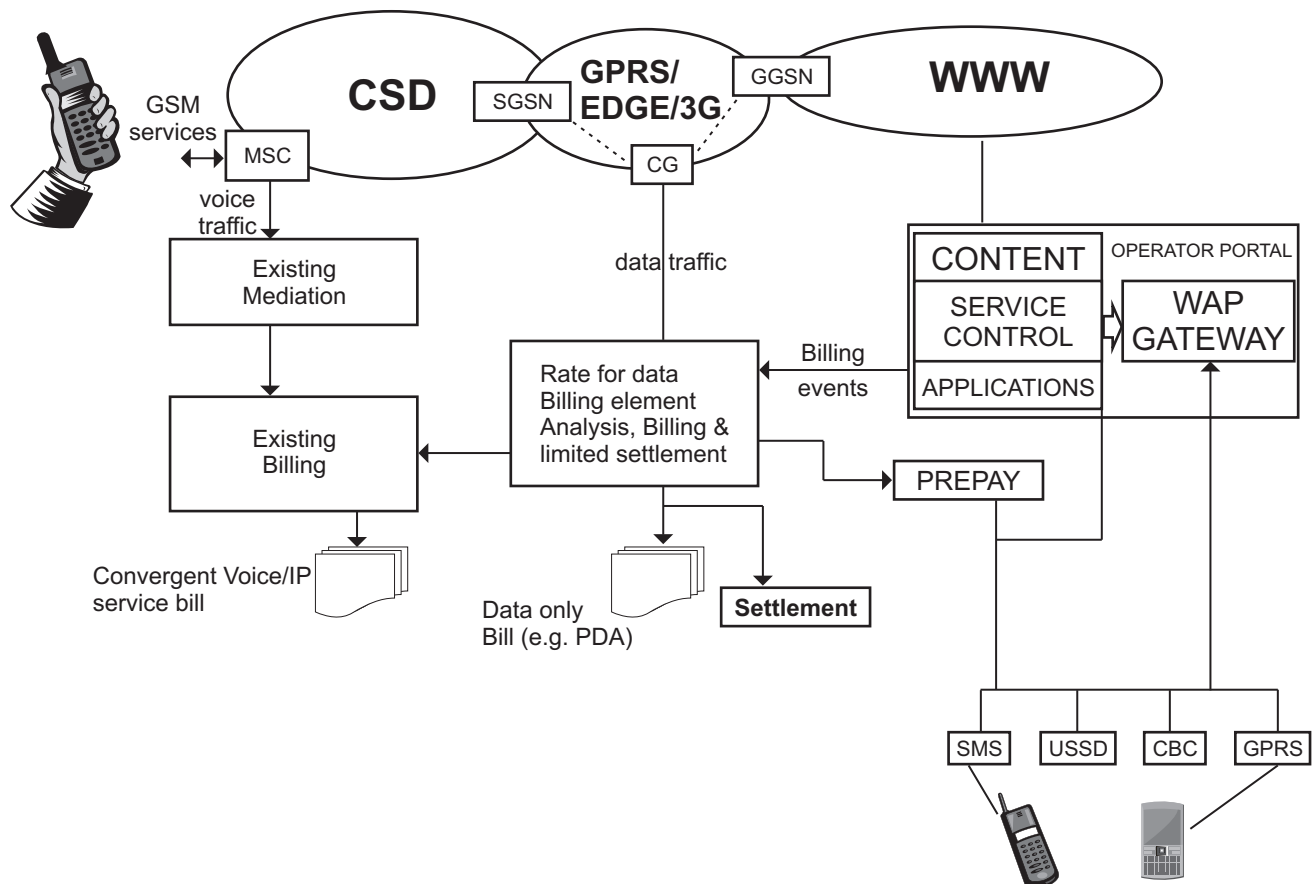


Figure 7: IP Service Billing (IP Component Add-on)

For billing of more complex transactional elements, however (such as email, or requested content) it is necessary to bring in a dedicated IP rating and billing engine to sit adjacent to the circuit-switched voice-billing platform. The legacy billing system remains the prime-invoicing engine in the medium term, assuming it is capable of producing a converged bill. The mediated data CDRs (Call Data Records) from the mediation device is brought into the IP billing engine, allowing the IP rating and billing engine to rate and collate all IP-related charging information before passing it back into the invoicing system. This will integrate the processing of all IP - related charging data and will allow the operator to benefit from the rating flexibility, which is likely to be found in the dedicated engine as shown in Figure 7.

Over time, it is possible that the IP billing system might become the prime-billing engine. Natural drivers for this will include the shifting balance of priorities and processing requirements from the circuit-switched voice environment to the IP environment and the eventual movement of voice traffic to the IP network with 3G services. With this interim step model, it will become possible to

offer a degree of convergent billing (at a billing only level), including handling complex cross product discounting. However, this model will not support fully convergent BSS, as customer data will still be entered / stored in different databases with greater or lesser degrees of consistency across them at any one time.

The introduction of a new billing system alongside legacy software will also introduce the need for integrated management of customers and services. There is a common rating engine which rates UDRs from voice traffic and data traffic simultaneously and generates a converged bill, as shown in the Figure 8 below. This requires a close analysis of existing CRM capability to determine whether it can provide a usable interface for the management of both customer databases. If this is not feasible, overlay architecture may need to be introduced to minimize duplication across both systems.

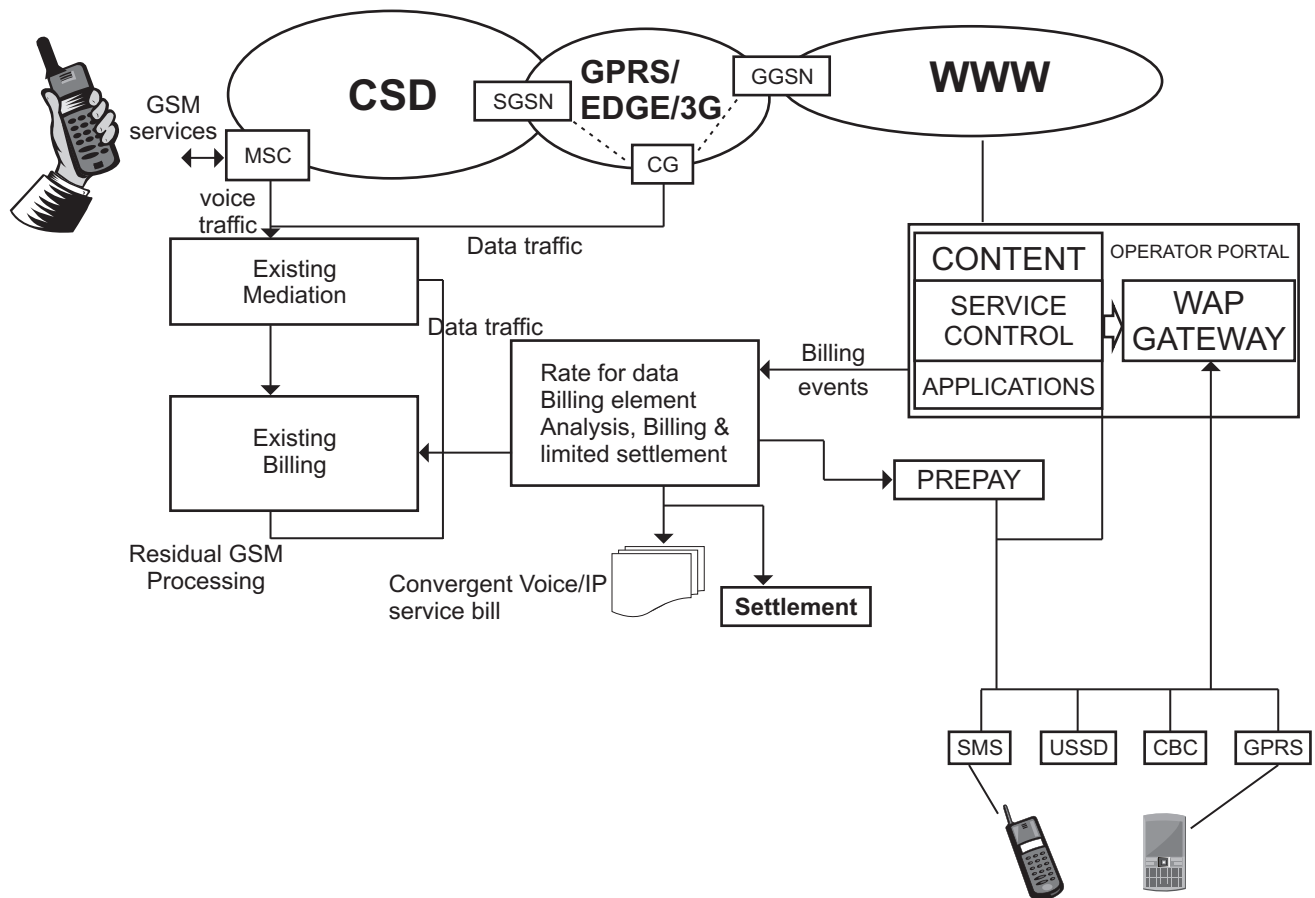


Figure 8: Alternate Introduction of IP Service Billing

5. Real Time Billing System:

In the long term, we may see the mediation function being absorbed within the real time transaction processing architecture. This environment is essentially a real-time environment interacting synchronously with the network elements same as an IN box would, providing real time rating and service management capability.

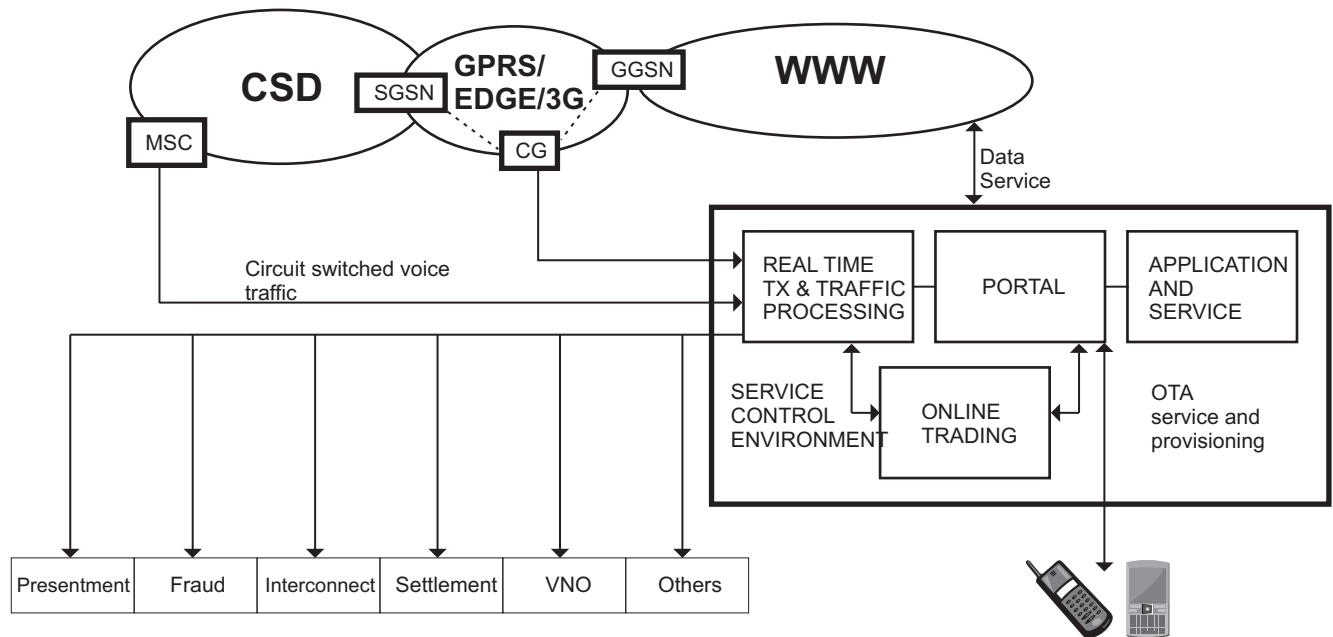


Figure 9: BSS Evolution Real Time Platform

The architecture above allows the operator to fully optimize service management, provision and rating by separating:

- Functions which need to be carried out in genuine real-time (such as rating and fraud monitoring)
- Functions, which need to be carried out immediately, post call or session (such as B2B order processing and CRM upgrade)
- Functions for which an interval of an hour or even a day may be acceptable (perhaps online charge presentment)
- Functions, which require processing over much longer periods (such as inter-carrier settlements)

Application suites and servers would be driven by the real time processing of all calls and sessions.

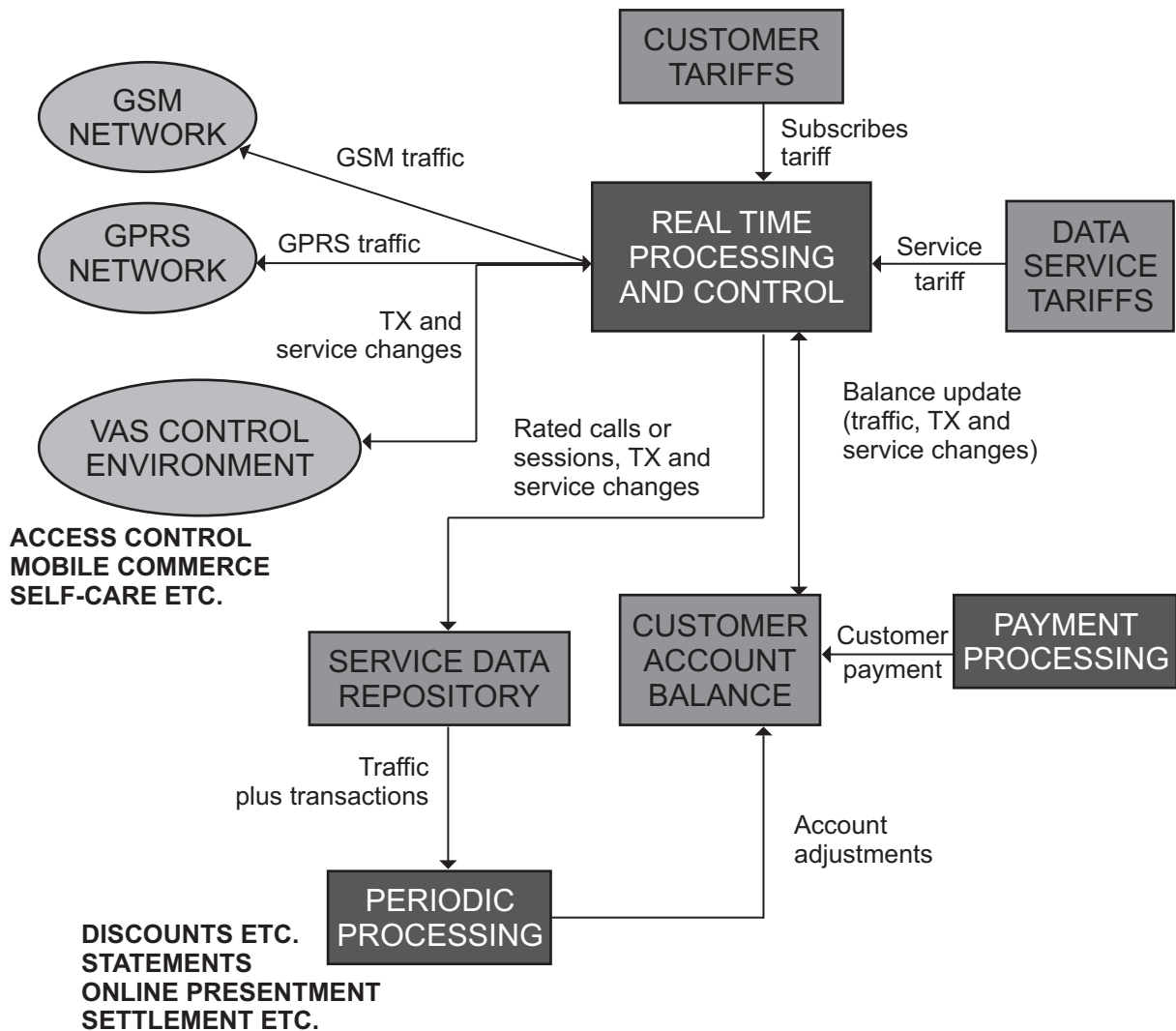
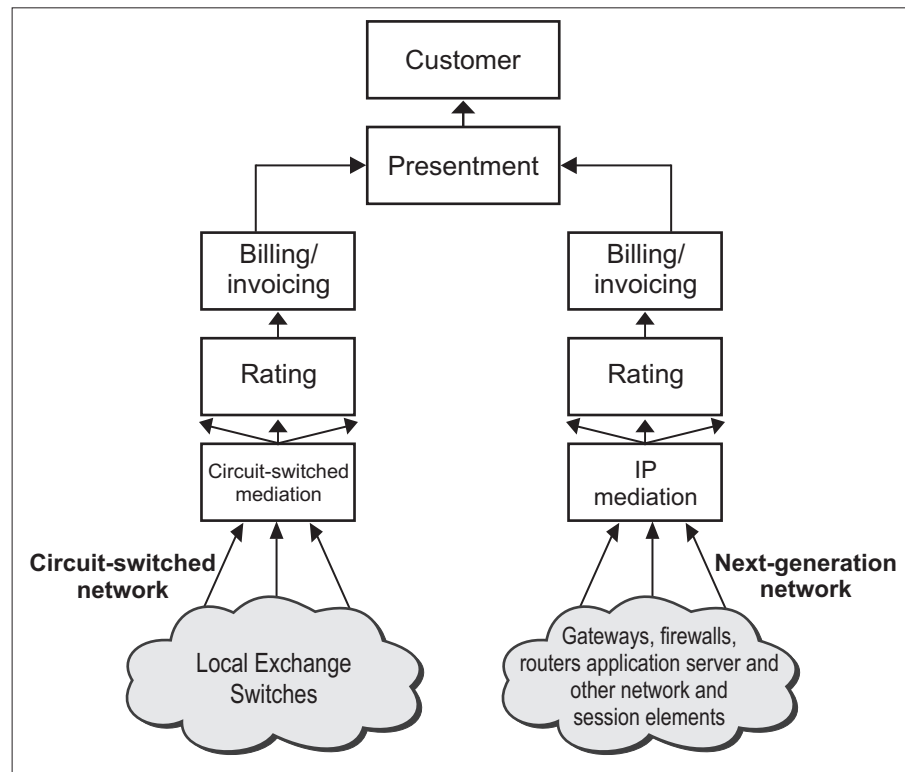
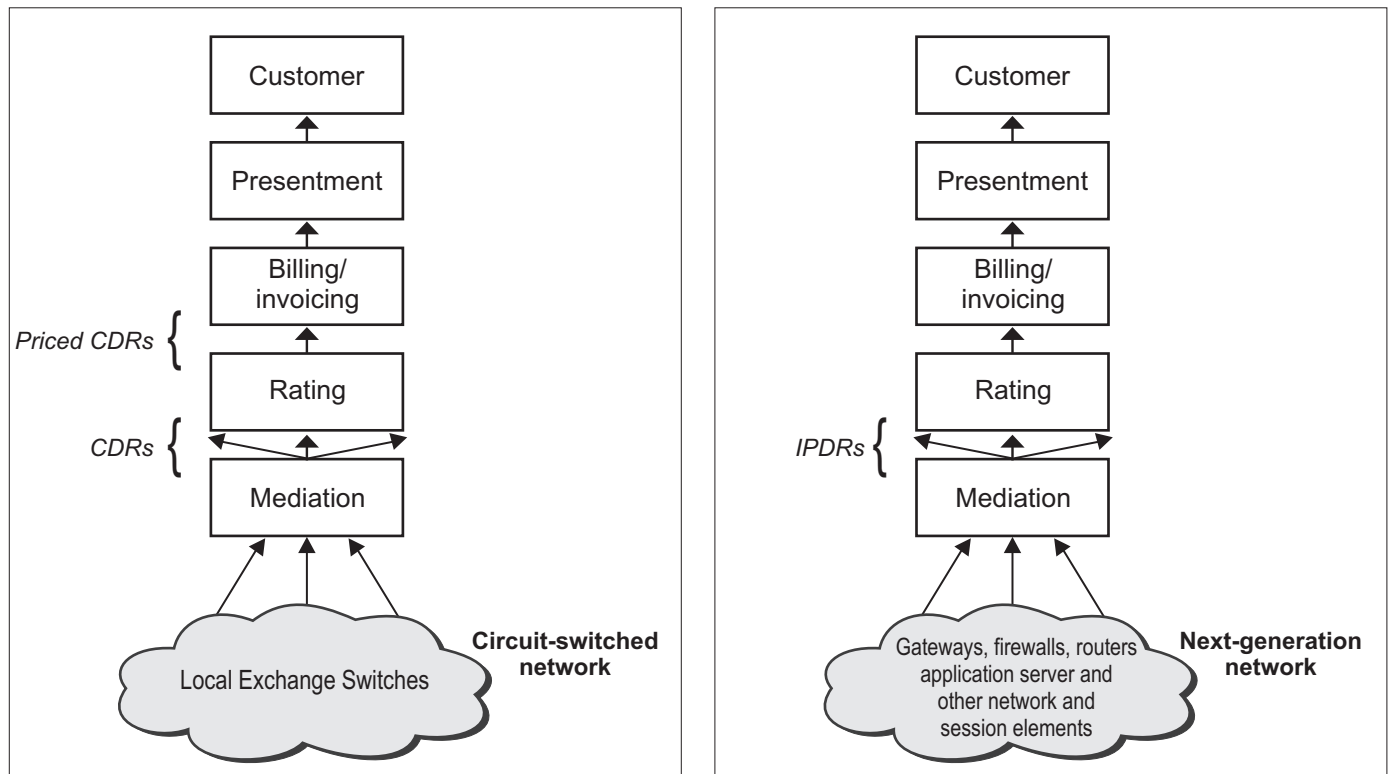


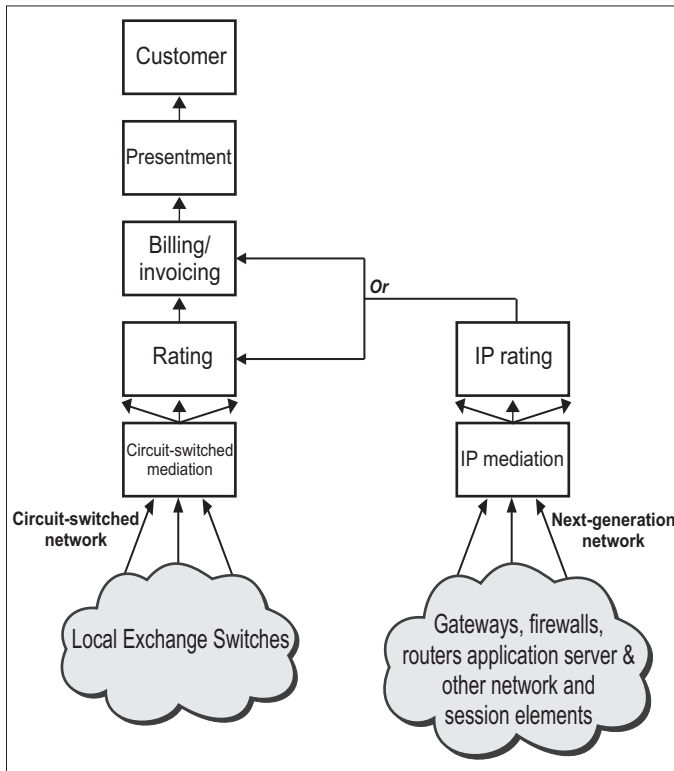
Figure10: Real Time and Service Processing

6. Convergence Roadmap:

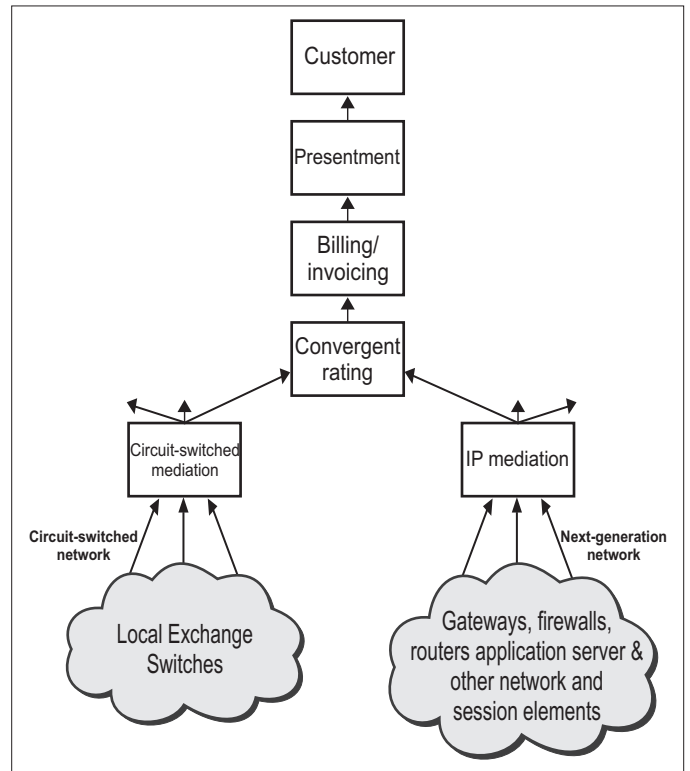
The transition from the current separate prepaid and postpaid systems to a convergent system may be achieved in several ways, in accordance with the customer's requirements. The approach can be a rapid transfer to a single convergent billing system or in a phased manner that guarantees benefits and ROI at each stage. A full-convergence solution can be implemented at once, maintaining existing IN SCP and additional network elements, and providing a smooth migration path from legacy systems. Alternatively, the convergence can be implemented through a phased approach, integrating different modules at each phase (e.g. Customer Care, Customer Database, Product Catalog, Rater) until a unified platform is achieved. The optimal implementation method differs from client to client and is defined on a case-by-case basis.

Transition of Billing Models

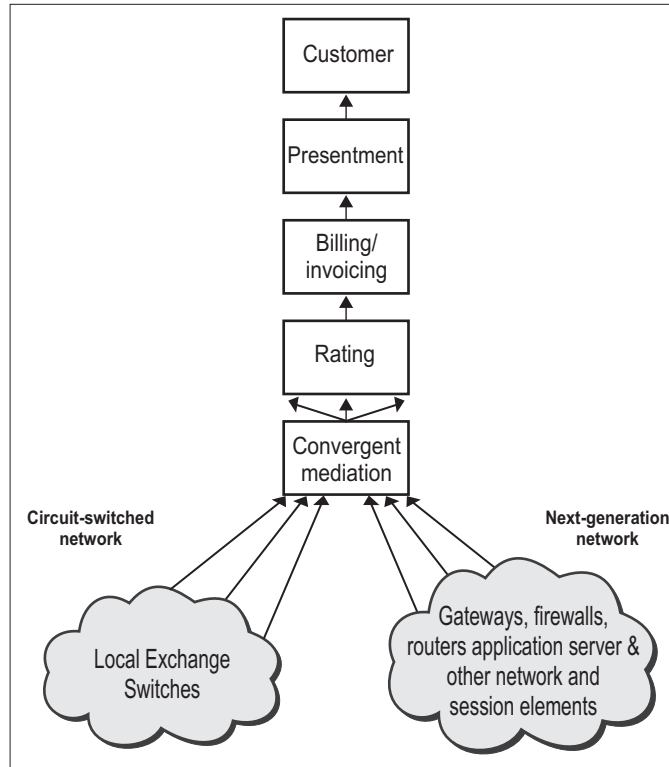




Stage 4



Stage 5



Stage 6

Figure 11: Transition of Billing Models

STAGE 1:

The first change is in the conventional billing system, where the CDRs are collected from the switches and are transferred to the Mediation, Rating and Billing Systems. The network here is the basic circuit-switched network.

STAGE 2:

A very little change is being witnessed in the second stage during the transition. The same billing system has been put to the next generation networks. Instead of the CDRs, the mediation engine collects IPDRs in this stage.

STAGE 3:

This stage witnessed a drastic convergence, where the circuit switched network and next generation networks billing systems are converged at the Presentment level.

STAGE 4:

Similar to the stage 4, this level has witnessed a convergence at the Billing System. That is mediation engines from circuit-switched and packet-switched networks collect CDRs and IPDRs respectively and forward them to their respective rating engines and finally the convergence happens at the billing system.

STAGE 5:

Convergent Rating is the next level of convergence, where there is a common rating engine for any kind of network. The mediation engines from circuit-switched and packet-switched networks collect CDRs and IPDRs respectively and forward them to one common rating engine.

STAGE 6:

The convergence in this level happens at Mediation level and a common converged Mediation system is available where CDRs, IPDRs or any kind of UDRs are collected and sent to the rating engine and hence forth the billing is carried forward.

Conclusion:

A true real-time convergent system should cater to the following:

- Complete convergence and real-time solution across any kind of service like Voice, Data, Content, Video, Fixed, Mobile, Cable, Satellite, Prepaid, Postpaid and any indefinite service
- Flexible online and offline charging capability; Flexible Payment mode; Credit Control of Postpaid users
- A common platform providing enhanced integration of any kind of service to offer stupendous customer experience
- Flexible enough to cater to triple-play, quad-play and multi-play services or any innovative service
- Turning billing components from cost centers to profit centers
- Reduce the TCO through improved operability and implementation efficiency

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IT Disaster Recovery Planning

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Abstract:

With the rapid growth, telcos have steadily become more dependent on their expanding IT infrastructures that help them automate, manage, and analyze their business operations and strategy. The fortunes of business are inextricably linked to the continuous availability of these services.

While IT infrastructures face varying risks of interruption, there is an increasing legal requirement for both protecting and retaining data for auditing purposes. This business obligation is forcing IT departments to ensure that the availability and disaster recovery of IT systems are sufficient to comply with these demands. In addition, as a result of the globalisation, internal and external customers expect higher levels of service availability. Together, compliance and increased user demand are creating more pressure on IT. All telcos depend on data centers' continuous operation and availability to earn revenue, maintain profitability and sustain customer loyalty.

Introduction:

1.1 Background

Typically IT offers four broad classes of services in the data center i.e. mission critical, business critical, business operational and administrative services. Each class, and possibly individual services within a class, has a service level agreement. The SLA defines different levels of protection against failure, whether caused by hardware/software issues, operator error, data loss or corruption, or other disasters. In addition, solutions are required to protect the actual data to make sure it is not lost permanently.

The following are the reasons/key drivers for us to embark upon the transformation:

1.1.1 Criticality of applications

IT manages a variety of business critical applications which are very helpful for the business not only

to manage the subscriber growth but also provide class services to its customers & improve EBITDA. It also provides a platform to analyze the customer behavior, their choice of plans and usage.

The below mentioned statistics shows the criticality of IT applications for any Telecom Service Provider's business

Customers(Basis)	100Mn
CDRs /- day(Basis)	5Bn
CDR processing per hour	240 Mn
Provisioning commands per day	2Mn
CRM Users	40000
CRM Interactions per month	75Mn
Call volume at Interactive Voice Record per month	170Mn

Table 1: Hypothetical Volumetric Data

1.1.2 Planned/unplanned downtimes/unavailability of systems

The above mentioned statistics clearly indicate the importance & criticality of IT systems because any unplanned downtime or even a planned outage will not only severely impact business revenue but also affects the customer services, partners and the overall productivity.

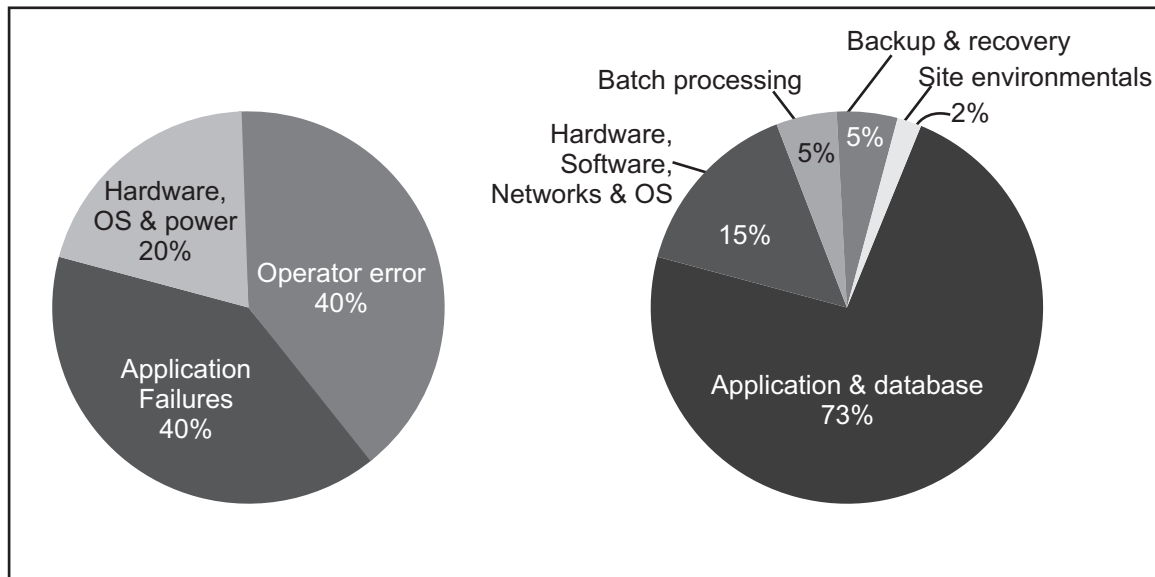


Figure 1: Causes Planned and Unplanned downtimes

1.1.3 Impact on business

For a business, an IT outage is not the real issue, but the consequences that are associated with it. Business consequences of outages can be revenue related or cost related. Below table depicts the details of core business activities and service impact, in case of non-availability of systems:

VERTICAL	CORE BUSINESS ACTIVITIES
Revenue Applications (Billing)	Subscriber Information, Service Provisioning, Credit Exposure, Dunning, Sales & Tariff, Roaming, Activations
	CDR Rating
	Bill Generation
	Business Users
	Business Critical Reports - Credit monitoring, Dunning, Aging Reports
	Tap Generation
Revenue Support (Mediation, Point of Sale, Prepaid, Interconnect)	CDR Processing
	Provisioning Commands
	SMS CDRs
	ICT Billing
	SMS CDRs Processing
	Material Receipts
	Location Tfrs
	Dealer Invoice
	Postpaid Activations
	Prepaid Product Config, CDR Processing, Subscriber Info, Provisioning & Charging
	Revenue Loss

Table 2: Core Business Activities & Service Impact

1.2 Key Objectives:

“Compliance, Sustainability & Operational Efficiency”

Compliance issues with the existing critical systems, such as Continuity of Operations or Basel II¹, SOX are the factors that impact business processes within the organization, the risks become even more complicated and intricate with application and business process interdependency.

Mission-critical services require technical solutions that include both service availability and a disaster recovery component as part of a full business continuity plan. The central objective is how to implement a high-availability or disaster-recovery solution in such a way that it can be operated successfully and efficiently.

We often base Recovery Time Objectives (RTOs) and Recovery Point Objectives (RPOs) on system requirements. What is needed is a process that links RTOs and RPOs to critical business processes.

Balancing risk with the costs of various recovery strategies is an iterative process. Within the telecom organization the coordination between the business continuity managers, senior level managers, legal and risk departments is critical so as to establish the key factors of security, storage, data archiving and retrieval, and restoration of systems to meet the enterprise RTO/RPOs. In today's business environment, an application system is entwined with the business process it supports. This should also hold true for the recovery plans of those systems and processes. The IT process implementer is aware that failures are bound to occur and cannot be avoided. It is necessary to plan for it in advance, both from a process and from a technical point of view, to take a broad view of the needs and the possibilities of implementation work.

2 Business Benefits:

Disaster Recovery Planning is a business function that details the measures required to restore technical infrastructures and services following disruption or disaster. The concern is to minimize the impact that such an event will have on the business.

A well-defined disaster recovery plan is built around the requirements and circumstances of an individual business, as well as the potential damages and degree of risk and exposure that IT infrastructure is exposed to.

“Disaster Management is a bit like an Insurance Policy, if you never need it, you wonder why you bought it. But, if you ever do need it, you are ever so glad you did.”

A well-structured and rehearsed disaster recovery plan provides system administrators and managers with the assurance that if the worst really does occur, steps are already in place to turn what would be for many a major disaster into a minor inconvenience.

There are many benefits of High Availability / Disaster Recovery that we should be aware of. It is important to implement these solutions within the organisation for many reasons like:

¹Basel II is an Operational Risk Management Standard

	DISASTER RECOVERY	HIGH AVAILABILITY
Purpose/Impact	To enable faster recovery of lost data and stalled business operations in the event of a disaster	To proactively avoid some types of disasters before they occur
Cost	Tangible IT investment	Tangible IT investment
Benifits	i) Faster time to recovery ii) Lower revenue loss iii) Continued Productivity iv) Reduced recovery costs	i) Reduced probability of disaster occurrence, ii) Improved operational efficiencies iii) Reduced planned downtime windows & costs
ROI	Soft (since the benefits is only realized in the event of a disaster)	i) Reduction of disaster probability is soft ii) Improved operational efficiencies can have direct impact on revenues and expenses iii) Reduced planned downtime generates real savings in IT costs through automation of procedures that can reduce the need for IT resources, eliminate human error and save in lost business from shorter downtime

Table 3: Benefits Of High Availability & Disaster Recovery

3 Due diligence

The criticality of the IT- system is identified by assessing the direct and indirect quantitative and qualitative impact on mission critical business processes with a reference to RTO and Maximum Tolerable Period of Disruption. The Quantitative impact is assessed based on the financial impact of a process interruption and the qualitative impact is assessed by impact scales.

3.1 IT Risk Assessment

IT risk assessment firstly is carried out to evaluate threats to the identified critical IT systems including the data centers to ensure the continuity of mission critical business processes. Secondly it will define actions that will limit the impacts of risks identified.

As a result of the risk assessment, measures are identified that:

- A) Reduce the probability of a disruption
- B) Shorten the period of disruption
- C) Limit the impact of a disruption on the mission critical business processes

The following categories of risks are considered for the assessment:

- A) Force majeure: Earthquake, flood, fire, storms, lightning etc.
- B) People: Terrorism, sabotage, thievery, strike, human mistake, etc.
- C) Operation and supply: Technical failure, software bug, lack / Breakdown of power and fuel supply etc.

The following chart is used to assess the probability of occurrence of threats and the impact (severity) on the mission critical business process with an aim to define a hierarchy among risks as High, Medium and Low and primarily focus on high and medium risks.

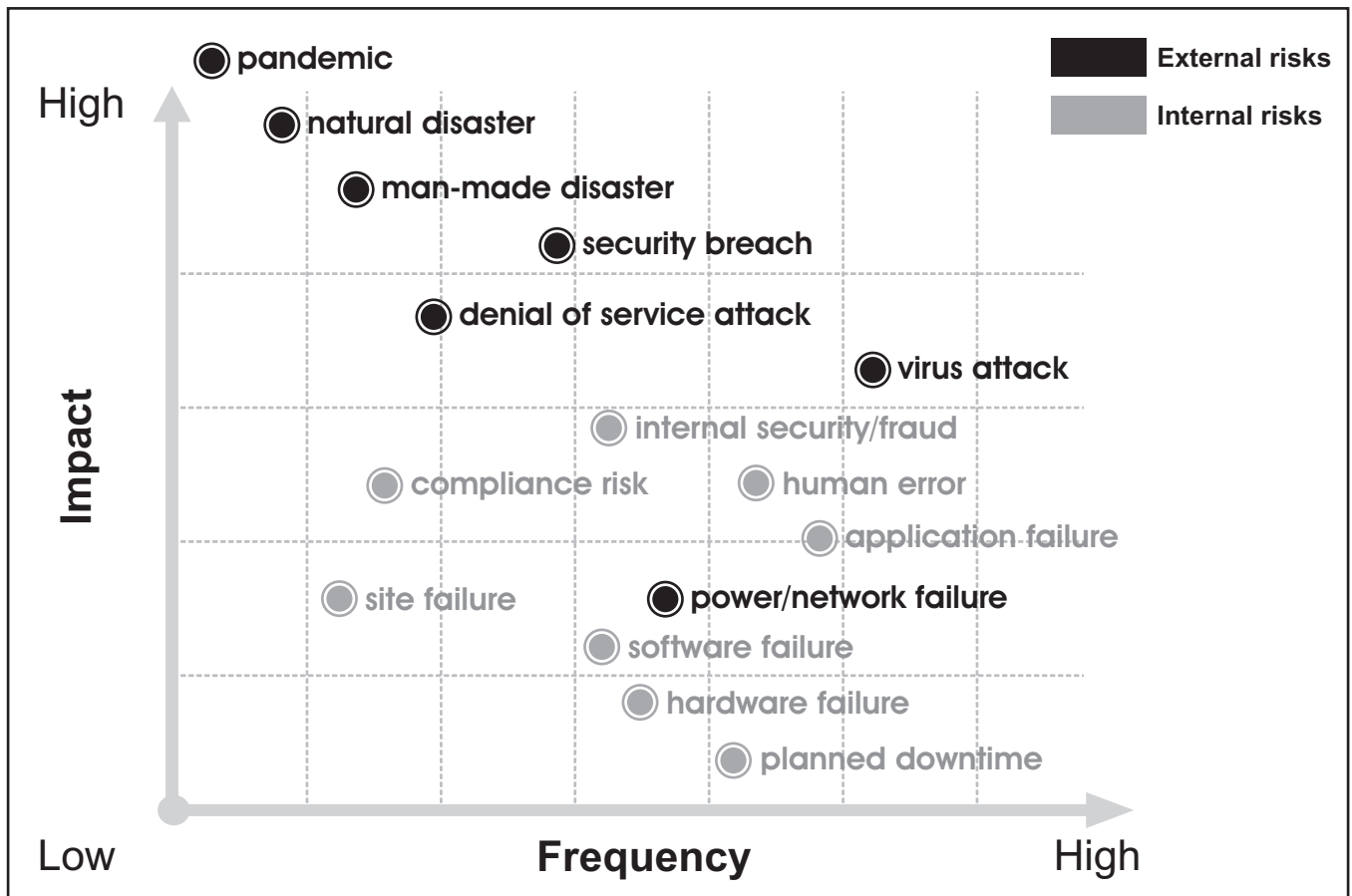


Figure 2: Impact & Frequency of Threats

3.1.1 Probability of Occurrence

The following table states and explains the grades that are assigned for the probability of the event to occur, while conducting the risk assessment exercise.

GRADE	DESCRIPTOR	DESCRIPTION OF THE DIFFERENT GRADES
5	Certain	Failure is almost inevitable or Is expected regularly in every week.
4	Likely	Repeated failures or Will probably occur 1 or two times in every month.
3	Possible	Occasional failures or Might occur every year.
2	Unlikely	Relatively few failures or Possibly every 2 years.
1	Rare	Failure is unlikely or Extraordinary event - less than every 10 years.

Table 4: Description of different grades of probability given in Risk Assessment

3.1.2 Impact Rating:

The following table states and explains the grades that are assigned for the impact of the event if it takes place, while conducting the risk assessment exercise.

GRADE	DESCRIPTOR	DESCRIPTION OF THE DIFFERENT GRADES
5	Very High	Situation catastrophic, business may never fully recover unless maximum allowable downtime required by the business can be met
4	High	Intolerable impacts - significant long term effects on revenue stream and customer retention.
3	Medium	Becoming intolerable/ unmanageable backlogs significant financial losses
2	Low	Short to medium term disruption but manageable, some financial loss and service impacts
1	Very Low	Problem can be locally managed short term business impact

Table 5: Description of different grades of impact given in Risk Assessment

3.2 Best Practices

Organizations choose the type of recovery site after analyzing the cost & benefit offered by the available options. There are three types of recovery sites - cold sites, warm sites, and hot sites. The differences between the types are determined by the costs and effort required to implement each.

Hot sites are traditionally more expensive than cold sites since much of the equipment the company needs has already been purchased and thus the operational costs are higher. However if the same organization loses a substantial amount of revenue for each day they are inactive, then it may be worth the cost. Another advantage of hot site is that it can be used for operations prior to a disaster happening.

The advantages of a cold site are simple 'COST'. It requires much fewer resources to operate a cold site because no equipment has been bought prior to the disaster. The downside with a cold site is the potential cost that must be incurred in order to make the cold site effective. The cost of purchasing equipment on very short notice may be higher and the disaster may make the equipment difficult to obtain.

When contracting services from a commercial provider of DR site capability telcos should take a note of contractual usage provision and invocation procedures, they may sign up more than one organization for a given site or facility, depending on various service levels. This is a reasonable proposition as it is unlikely that telcos using the service are likely to need it at the same time and it will allow the provider to offer the service at an affordable cost.

3.2.1 Trends across the Globe

According to adoption of advanced DR techniques, of Forrester/Disaster Recovery Journal October 2007 Global Disaster Recovery Preparedness Online Survey, 33% of the organizations interviewed

have more than one recovery sites in case of failures. 30% of them share IT infrastructure at a service provider. 61% use replication for their mission critical systems and 56% use tape backup for business critical applications.

Following are the detailed findings of the survey²

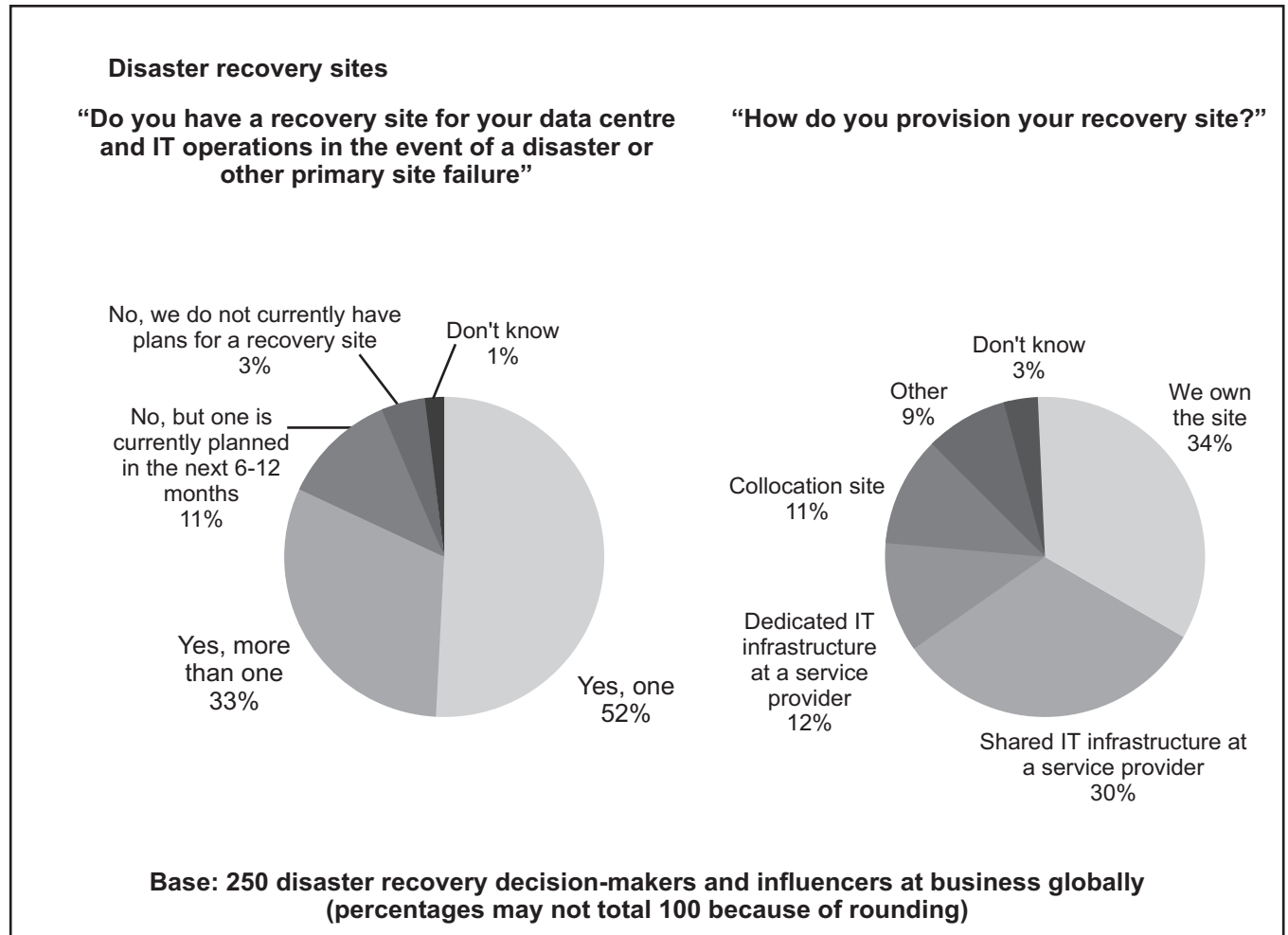


Figure 3: Adoption of Advanced Disaster Recovery techniques: DR sites

²Source: Forrester/*Disaster Recovery Journal* October 2007 Global Disaster Recovery Preparedness Online Survey

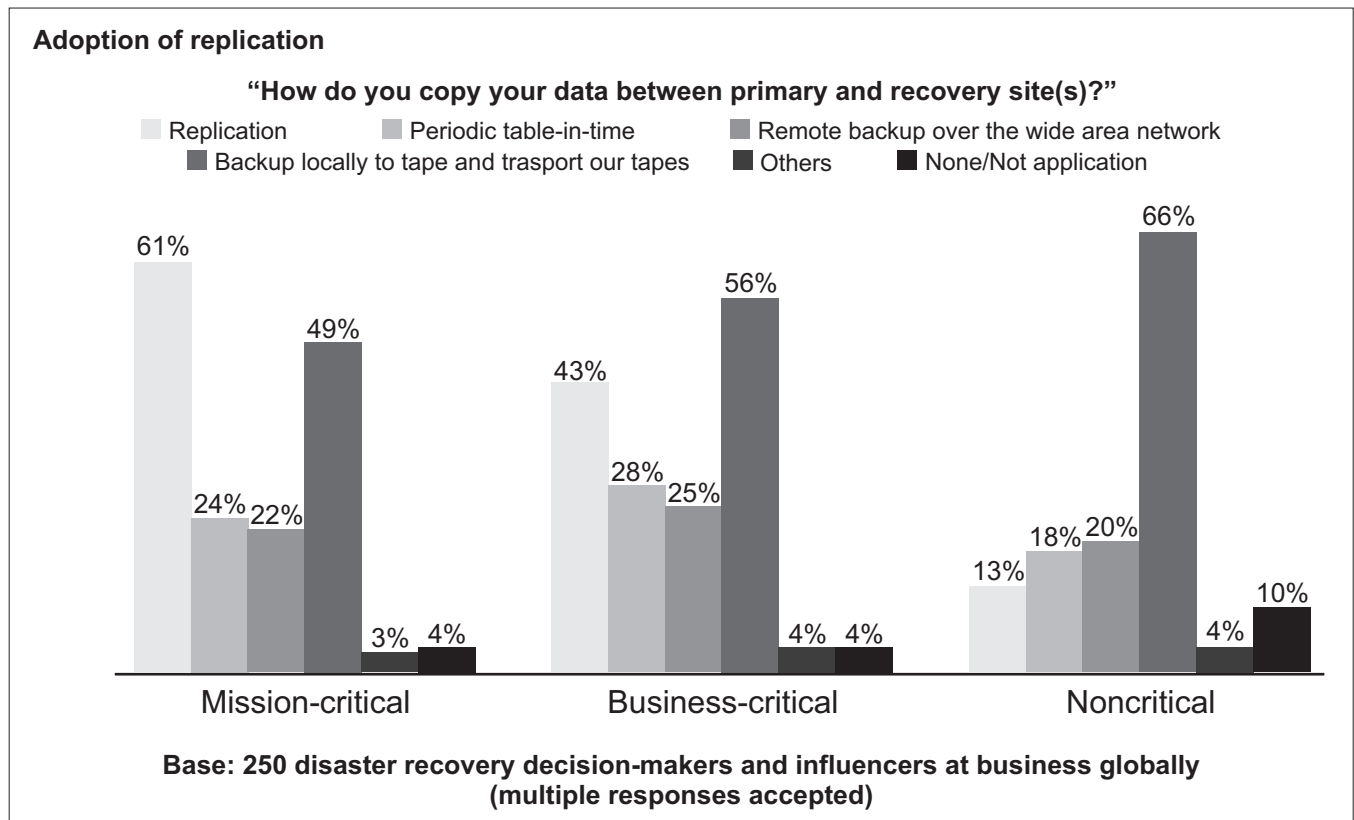


Figure 4: Adoption of Advanced Disaster Recovery Techniques: Adoption of Replication

²Source: Forrester/*Disaster Recovery Journal* October 2007 Global Disaster Recovery Preparedness Online Survey

3.2.2 3-Site DR Architecture

Till date, the 3-Site Disaster Recovery is the best solution which is being followed by the organizations across the globe. This architecture is the combination of hot site and warm site. The setup consists of 3 Data Centre sites in all, including Primary site, Near/Bunker Site, and DR site.

A 3-Site DR solution schematic has been shown below.

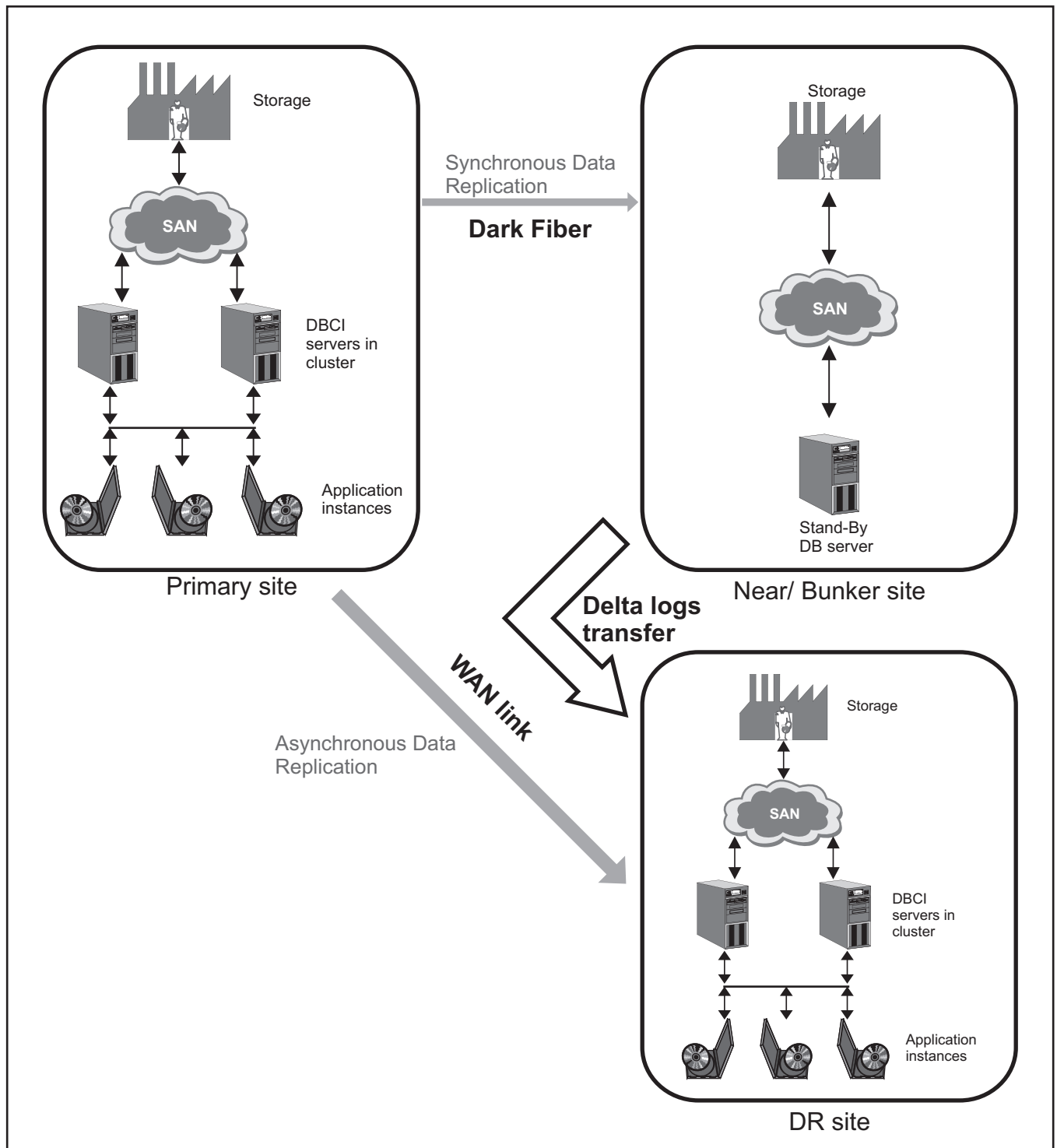


Figure 5: 3-Site DR solution Schematic

The 3-Site Architecture is employed to achieve RPO=0 (very negligible data loss). To achieve this objective the system must have synchronous replication of database between Primary and Near-Site. This mechanism has a limitation of the distance i.e. the distance between Primary and Near-Site should not be more than 40-60 KM. Because of this drawback the data cannot be replicated for long distance but will do for short distances. Therefore a 3-Site, including Primary, Near/Bunker, and DR site solution might achieve RPO=0. In this kind of a setup synchronous replication is carried out using dedicated Fiber links between Primary and Bunker Site. And Asynchronous replication to the DR site which is located beyond 100 KM, (in a different zone) using WAN links.

While implementing the 3-site DR solution a few things must be taken into the consideration, e.g. In case of a regional disaster, Primary and the Near site don't get destroyed at the same time, then only RPO can be zero. (Depends on the location of the near site) If both, Primary and Near site are down, RPO will depend upon link between Primary and DR site.

The Near site which is going to be setup must have a certain level of redundancy in place e.g. different & multiple power sources, redundant CPUs etc. to avoid single point of failure.

Following are the steps taken when Primary site has a failure:

- Data is replicated in Real time to Near Site.
- Delta data (DR Site minus Primary Site) is synced from near site to DR site.
- DR site will be activated depending upon the RTO defined initially by the business.

Following are the key processes in case of an outage:

- Switchover process to move operations to DR site during planned downtime
- Switchback process to move operations back to Primary Site after switchover
- Failover process to move operations to DR site during Primary site outage (unplanned)
- Failback process to move operations back to Primary site after Failover

4 Analysis of various solution approaches

Mission-critical and some business-critical services must continue to meet their SLAs even in the face of a major disaster at the primary data center. In order to maintain these services in the event of a disaster, a secondary IT infrastructure must be available at a site sufficiently remote from the primary site so that it is not affected by the same disaster. The time to recover and restart the service is then the sum of the time it takes to decide to enact the disaster recovery plan and switch to remote site operations plus the time it takes for the service to be brought up on the system at the secondary site.

For less critical services where data is not continuously replicated to the secondary site, the time to bring up the service includes the additional time component of restoring data from tape or a point-in-time disk copy, if required.

Regardless of the technique employed, it is important to monitor and address any changes to the service and, in particular, to address any changes in data volume. If, for example, the primary site allocates more storage, but this change is not propagated to the data continuity solution on the secondary site, this mismatch can cause the service to fail to start on the secondary site in a disaster situation.

4.1 Comparing Disaster Recovery Solutions

Table below compares the benefits and drawbacks of the data recovery mechanisms. A high RPO indicates the service can survive with data that might be out of date, while a low RPO indicates the data

must be as current as possible, if not completely up to date.

METHOD	COST	RPO	RTO	PERFORMANCE IMPACT
Tape Backup and Restore	Low	High- but dependent on when the last usable backup was created	High- typically three times the time it takes to backup the data	Low- though the backup process might have some impact depending on the precise mechanism
Remote Mirror	Medium	Medium- due to vulnerability to deletion or corruption	Low- so long as a suitable host and software environment are available to restart the service on the remote site	Medium- but dependent on the distance to the remote mirror
Synchronous Host-Based Data Replication	Low- because additional storage space is required to provide complete protection against data deletion or corruption, and low cost storage can be used	Low- but only if coupled with snapshot techniques to guard against loss through corruption or deletion	Low	Medium- so long as sufficient inter-site network bandwidth is available and its latency is low enough to meet peak application I/O demands
Asynchronous Host-Based Data Replication	Low- because additional storage space is required to provide complete protection against data deletion or corruption, and low cost storage can be used	Medium- but only if coupled with snapshot techniques to guard against loss through corruption or deletion	Medium- so long as a suitable host and software environment are available to restart the service on the remote site	Medium- so long as sufficient inter-site network bandwidth is available and its latency is low enough to meet peak application I/O demands
Synchronous Storage-Based Replication	Medium- because additional storage space is required to provide complete protection against data deletion or corruption	Low- but only if coupled with snapshot techniques to guard against loss through corruption or deletion	Low- so long as a suitable host and software environment are available to restart the service on the remote site	Medium- so long as sufficient inter-site network bandwidth is available and its latency is low enough to meet peak application I/O demands
Asynchronous Storage-Based Replication	Medium- because additional storage space is required to provide complete protection against data deletion or corruption	Medium- but only if coupled with snapshot techniques to guard against loss through corruption or deletion	Medium- so long as a suitable host and software environment are available to restart the service on the remote site	Medium- so long as sufficient inter-site network bandwidth is available and its latency is low enough to meet peak application I/O demands
Transaction Monitors/ Application Servers	High- because application software might need to be rewritten to use these technologies	Low- if two-phase commit type logic is used, no transactions should be lost	Low	Low- because only transactional information needs to be passed between the sites
Database Replication (but only addresses database data)	Medium- dependent on ISV licensing costs	Configurable	Variable	Low
Data Guard	Medium	Configurable	Variable	Low

Table 6: Comparison of Disaster recovery solutions

4.2 Comparison of Standby Database Hybrid and Pure Volume Replication:

If a database has to be replicated across thousands of miles, data propagation time might preclude synchronous volume replication and lead to adverse effect on application responsiveness. Similarly, if database corruption by unstable applications is a concern, the standby database technique with delayed application of archive redo logs would probably be the preferred solution. On the other hand, if rapid recovery from a primary site disaster is the main concern, volume replication is probably the best solution, because the recovery process is less time consuming and complex than with standby database recovery. Table below compares key aspects of the hybrid and full volume replication techniques.

CHARACTERISTIC	STANDBY DATABASE REPLICATION WITH VOLUME REPLICATION FOR ONLINE REDO LOG	VOLUME REPLICATION OF ENTIRE DATABASE
Cost	Potentially lower communication cost because archive redo logs are batched (greater efficiency) and are not latency-critical	Potentially higher communication cost because synchronous replication I/O is in the application response path and therefore latency is critical
Replication Granularity	Individual tables	Contents of a volume(usually more than one table)
Protection against Database Corruption	Better, because application, operating system, or storage subsystem-caused corruption is not reflected in the standby database until archive redo logs are applied	Any application, operating system, or database management system caused corruption is reflected immediately in the secondary image
Database Operational Performance	No impact on database; minor impact possible when archive redo logs are copied and sent to secondary site; some impact if replication of the online redo log is synchronous	Each write request incurs SRL write delay plus message round trip time(synchronous replication)
Failover Time (time until applications can begin using database at secondary site)	Possibly longer. All archive redo logs not yet applied to the standby database must be applied, and the online redo log must be replayed	Shorter. Treated as an Oracle crash recovery. Online redo log need be replayed
Failback Time (move operational database back to original primary site)	Much shorter if database image at primary site survived the disaster. Archive and redo logs recorded since failover must be sent to the primary site and replayed against the database image	Longer. Image of operational database at secondary site must be created at primary site.If operational database is used by applications during restore, a switch of primary sites is required
Management Simplicity	More complex to configure; both VERITAS Volume Replicator and Standby Database Replication must be configured	Simpler. Worst case disaster recovery scenario is approximately equivalent to Oracle local crash recovery

Table 7: Comparison of Standby Database Hybrid and Pure Volume Replication

4.3 Comparing Availability solutions

Table below compares the cost, achievable server availability levels, recovery times, complexity, and overall risk of the three potential availability solutions discussed in the previous sections. The indicative availability figures quoted below are generating from field measurements and from component mean time between failure (MTBF) numbers.

METHOD	COST	AVAILABILITY LEVEL	RTO	MANAGEMENT COMPLEXITY	OVERALL RISK
Single Resilient Server	Low - no additional hardware or software needed	Average - a single server should achieve 99.9 percent availability	Medium - reboots on large servers can take up to 30 minutes. Serious hardware problems can cause even longer outages.	Low - this is a single server and hence the baseline for management complexity	Medium - problems that cannot be overcome by the server's Reliability, Availability, Serviceability features can cause extended outages
Home-Grown availability solution	Medium - an additional, dedicated server might be needed	Good - availability levels in excess of 99.9 percent should be achievable	Low - a standby server is available to switch the load to, minimizing outage time to that of problem detection and service restart.	High - any home grown software needs maintenance and testing. Corner case ³ problems can result in a risk of data corruption.	High - corner case problems together with ongoing software support issues make this solution a much greater risk than a vendor based solution
Vendor Availability Solution	Medium - a minimum of two or more servers are needed	Good - availability of 99.97 percent or more should be achievable	Low - most problems are automatically detected within a few minutes. Outage times are dominated by service restart times.	Medium - additional training on cluster management is needed for operations staff. Good procedural documentation is important for maintaining availability levels.	Low - due to 24X7 support and ongoing development by the vendor, the solution is likely to have a greater level of robustness.

Table 8: Comparison of availability solutions

³Extreme cases with combinations of failures or unusual or unexpected conditions, including cascading failures, exhausted resources, etc.

5. Dependencies

Every IT project has dependencies in line, for example, delivery of other projects, outsourcing partner, third party vendors, issues like Infrastructure availability and other teams within an organization as well.

5.1 Delivery of other projects

The implementation of HA/DR is highly dependent on these convergence projects because of several factors like infrastructure, system unification, process automation/unification.

5.2 Service Partners and Vendors

To decide upon the appropriate outsourcing partner and hardware/software vendors is one of the major business as well as technological decisions, any organization has to take. For business, the decision criteria include the financial investments, the time period quoted by the vendor, least downtime and various strategic decisions. For IT/Technical division of the organization the decision criteria include the technology offered- both hardware and software, previous implementations of HA/DR by the vendor, the proposed SLA and other technological aspects.

5.3 Business Dynamics

With the implementation of MNP and 3G, there is an uncertainty about the infrastructure and system changes within IT. As the popularity of VAS increases in Indian telecom in the near future telcos will analyze the compatibility of their current IT infrastructure with the new services and offerings that will be offered to the end customers. As the systems and the data base are very closely interlinked, the HA/DR deployment will certainly be affected by rapidly changing business dynamics of the Indian telecom.

6 Risk Mitigation Plan

KEY RISKS	DESCRIPTION	IMPACT	MITIGATION PLAN
Outage of service provider	Outage of service provider may lead to operational disruption	i) Loss of revenue and or interest ii) Impact on end customer iii) Impact on internal customer or other departments iv) Data loss v) Data Availability	i) SLA with the service provider should be regularly reviewed and revised ii) Multiple service provider
Ineffective / Outdated SLA	Ineffective SLAs, or lack of a process to enforce SLAs, may lead to production delays or lapses in quality	i) Loss of revenue and or interest ii) Impact on end customer iii) Impact on internal customer or other departments iv) Data loss v) Data Availability	SLA with the service provider should be regularly reviewed and revised
Legal and Regulatory Risk	The inability to manage legal and regulatory requirements may lead to a production interruption or significant fines / penalties	i) Loss of revenue and or interest ii) Impact on end customer iii) Impact on internal customer or other departments iv) Financial Loss v) Data Availability	Regular review of backup policies in order to comply with regulator's policies. Regular evaluation of HA measures
Changing Business Dynamics	i) The implementation of MNP, 3G and other technological advancements may lead to uncertainty about infrastructure and other technological requirements ii) Increasing competitors in an already saturated market may lead to financial loss if M&A norms are not relaxed	i) Loss of revenue and or interest ii) Impact on internal customer or other departments iii) Financial Loss	i) Continuous capacity review ii) Regular check on data growth rate iii) Keep in sync with business

Table 9: Risk Mitigation Plan

7. Acronyms & Abbreviations

ABBREVIATIONS	DESCRIPTION
3G	Third Generation Mobile Telecommunication
CDR	Call Detail Record
CRM	Customer Relationship Management
DR	Disaster Recovery
DB	Database
EBITDA	Earnings Before Interest, Taxes, Depreciation, and Amortization
HA	High Availability
I/O	Input/ Output
IT	Information Technology
MNP	Mobile Number Portability
ROI	Return On Investment
RPO	Recovery Point Objective
RTO	Recovery Time Objective
SOX	SarbanesOxley Act
SLA	Service Level Agreement
TIA	Telecommunications Industry Association
Telco	Telecommunications Company
VAS	Value Added Services

References:

Sr. No.	TOPIC	URL
1	Architecting Availability and Disaster Recovery Solutions	http://www.sun.com/blueprints/0406/819-5783.pdf
2	Backup	http://en.wikipedia.org/wiki/Backup
3	Benefits of Disaster Preparation	http://disasterrecoverymanagement.com/benefits_of_disaster_preparation.shtml
4	Building business case for disaster recovery spending	http://www.forrester.com/rb/Research/building_business_case_for_disaster_recovery_spending/q/id/42949/t/2
5	Data centre approach	http://www.ortronics.eu/en/scripts/en/publigen/content/templates/prevviewInfo.asp?P=571&L=EN
6	Disaster Recovery Planning	http://www.bcs.org/server.php?show=conWebDoc.1488
7	Disaster Recovery: Best practices	http://www.cisco.com/en/US/technologies/collateral/tk869/tk769/white_paper_c11-453495.html
8	High Availability- Concepts, Design, Implementation -By Klaus Schmidt	http://www.linbai.info/computers-it/high-availability-and-disaster-recovery-concepts-design-implementation.html
9	High Availability/Disaster Recovery ROI	http://www.information-management.com/news/1014486-1.html?pg=2
10	Linking disaster recovery business compliance	http://www.sun.com/software/whitepapers/solaris10/disaster_recovery.pdf
11	NISCC : Protecting Data Centre's good practice guide	http://www.cpni.gov.uk/Products/bestpractice/3019.aspx
12	State of enterprise disaster recovery preparedness: Q3 2009	http://www.forrester.com/rb/Research/state_of_enterprise_disaster_recovery_preparedness_q3/q/id/55695/t/2
13	Symantec DR Survey 2008	http://eval.symantec.com/mktginfo/enterprise/other_resources/b-symc_disaster_recovery_study_findings_2008.en-us.pdf
14	Ten Tips for successful IT disaster Recovery Planning- Paul Chisholm	http://www.crseattle.com/PDF's/Ten%20Tips%20for%20Successful%20IT%20Disaster%20Recovery%20Planning.pdf
15	The Benefits Of Preparing For Disaster Recovery	http://www.bizhelp24.com/small-business/the-benefits-of-preparing-for-disaster-recovery.html
16	The top ten most forgotten things when building a disaster recovery plan	http://www.hiperlogic.com/docs/HiperLogic_TopTenDR.pdf
17	TIA-942 Data Centre standards overview	http://www.adc.com/us/en/Library/Literature/102264AE.pdf
18	What are the advantages and disadvantages of disaster management	http://wiki.answers.com/Q/What_are_the_advantages_and_disadvantages_of_disaster_management

Near Field Communication on Mobile- The Next Generation Mobile Transactions

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Abstract:

Near Field Communication (NFC) operates in globally available 13.56 MHz band with a range of about 10 cm. Services provided by NFC enabled mobile phone offer end-consumers many benefits like convenience and portability for applications like payment, mobile enabled transport and event ticketing, etc. This eco-system involves large number of diverse players ranging from the Service or Utility Provider, Mobile Manufacturer, Mobile Operator, Semiconductor Provider, System Integrator, Banks, Payment Gateways etc. The first generation of NFC integration in mobile phones was driven in different directions by different sub-groups of the stakeholder keeping their interests in mind. All the groups finally came together to define and approve non-proprietary technical standards for interconnection communication for the different elements of the NFC on mobile system, the European Telecommunications Standards Institute (ETSI) Single Wire Protocol (SWP) and Host Controller Interface (HCI).

In this paper, we give a comparison of the legacy NFC on mobile eco-system with the new generation of NFC on mobile eco-system enabled by the non-proprietary standards. The ETSI HCI and SWP standards provide managed connectivity between NFC controller, Contact-less Front End and Universal Integrated Circuit Card (UICC) or called Subscriber Identity Module (SIM) as secure element which is explained with the architecture of new generation of NFC enabled mobile phones. Further we show how it provides an opportunity for each NFC eco-system member to have a point of influence in the system and thus pave way for mass roll-out of the NFC technology. We also include deployment examples of NFC for different applications, providing new user experience of convenience and secure transaction through mobile phone. Business forecasts also indicate many opportunities for NFC eco-system players.

1. Introduction:

Near Field Communication (NFC) technology is an extension of existing RFID technologies defined under ISO/IEC 14443 proximity card and ISO 15693 vicinity card. NFC combines reader and card infrastructure in same device. These features are standardized by European Computer Manufacturers Association (ECMA) under ECMA-340 (NFCIP-1) and ECMA-352 (NFCIP-2). NFC device can communicate with other NFC device and existing proximity cards of Type A, Type B, FeliCa, and Vicinity Cards. These cards are well deployed for various applications in the field. In addition, NFC Forum also defines higher layer common data format, which can be used to store and transport different kinds of data items over NFC link.

NFC operates in globally available 13.56 MHz frequency band with operating range of 10 cm. It supported data rates of 106, 212, 424 or 848 Kbps with two different communication modes:

- Passive communication mode (Inductive Coupling): Initiator creates the RF field which energizes the target. Target does not create any RF field, but uses initiator's RF field to communicate by load modulation. This mode is generally used for smart card and reader communication where smart card does not have power source connected and it uses the power from reader's RF field.
- Active communication mode: Initiator and target both alternatively generate the RF field for communication. This mode is generally used for peer-to-peer communication, where peer NFC devices have power source.

2. NFC Applications:

Applications for NFC technology are growing continuously, appearing in various areas of day to day life. Especially the applications in conjunction with mobile phones offer great opportunities for end users and mobile phone eco-system players. Technical capabilities of the NFC technology mainly cater to applications spread across three different families:

- 1) Applications of card emulation, where NFC enabled mobile phone can act as a contactless smart card for payment (Refer Figure 1.1 and Figure 1.4), ticketing (Refer Figure 1.2), access control (Refer Figure 1.5), transit, payment at toll-gate etc.
- 2) Applications of peer-to-peer communication, where two NFC enabled mobile phone or devices can communicate with each other for easy and convenient device association, setup, configuration and data transfer like exchange of business cards, multi-media information sharing etc. (Refer Figure 1.6)
- 3) Applications as smart card reader, where NFC enabled mobile phone can be used as contactless card reader which can be used for information access on move, e.g. Reading product information from a smart poster. (Refer Figure 1.3)



Figure 1: NFC applications in Mobile phone domain

3. Eco-system

It has been over years NFC has been around with different types of setup and architectures but still deployments are limited to trials or application dedicated roll-outs. The eco-system has been evolving along with the technology and applications. Some of the mass market business already exists for transport or payment in contactless smart card domain and users have experience of the usage of same. When replicating this with the NFC on mobile there were many hurdles that had to be overcome.

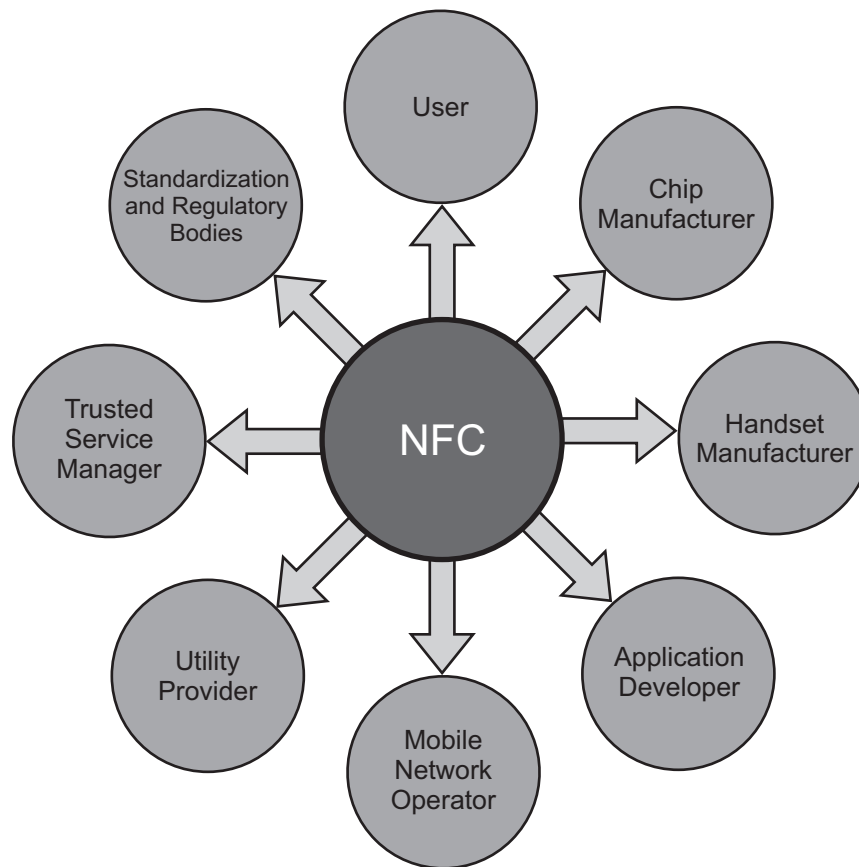


Figure 2: NFC Eco-system

Figure 2 shows NFC Eco-system and different players. Different players and their roles in the NFC eco-system are as below:

User: This is end user who owns NFC enabled mobile phone and enjoys the services provided by the NFC eco-system.

Chip Manufacturer: Chipset manufacturers provide the key components (ICs) needed for all NFC devices, in line with the relevant technical standards, which includes hardware, firmware, driver etc. components for NFC IC, Secure Elements, UICC, SD card etc.

Handset Manufacturer: Producer of NFC enabled mobile phone. It also provides the environment for application developer and utility provider to provide application and services for NFC enabled mobile phone. Many handset makers also create phone-to-phone proprietary NFC applications on top of the standardized data exchange.

Application Developer: Designer and developer of NFC enabled application for mobile phone.

Mobile Network Operator: Provides the mobile services to user, which includes voice and data services and acts as a conduit for service provisioning.

Utility Provider: Providers of the contactless services to user e.g. Bank, Transport Company, and Retailer etc.

Trusted Service Manager: TSM is a trusted party who helps the utility provider to securely distribute and manage the NFC application services to end user through the Mobile Network Operators.

Standardization and Regulatory Bodies: Develops global standards for NFC system ensuring interoperability, backward compatibility and future development of NFC eco-system.

Looking to the above eco-system, although mobile phone is an enabler, it does not have a participating or influencing role. A collaborative approach for NFC, like establishing a joint venture with revenue sharing was also not working out because of difference in interests of the different players. These problems were leading to one of the player being a dominant and hence meant proprietary solutions, which was a discouraging factor for market penetration. Initially the role of Trust Service Manager was not clear and what it meant to end user. Also one Trusted Service Manager and multiple utility providers require another level of integration between different companies and economical viability of the setup.

Not to forget, the standards were not complete and certification processes were still in their early stage. Delay in mass roll-out and slow growth of NFC is leaving the market being open to competing technologies. Without acceptability in key markets like payment and transport, chip and handset manufacturers were not taking risk of ramping up the NFC enabled mobile phone volumes.

These aspects are also evident from the initial system architectures of NFC on Mobile, which are explained in following section.

4. NFC on Mobile Phone: Initial System Architectures

There are three main elements in an NFC on Mobile Phone System:

1. **NFC IC or NFC Controller:** NFC IC provides the communication mechanism based on the NFC standard, hence also called as NFC Modem.
2. **Secure Element:** Secure element is a secure storage similar to stand alone smart card. This is used to securely store all the information required for an application or transaction e.g. Transport ticket or Bank card information.
3. **Application Processor:** The mobile phone baseband processor which manages the NFC Modem, Secure Element and also provide other value added applications like Card Reader and Peer-to-Peer (Phone-to-Phone) communication.

The NFC Modem in one mode emulates a smart card exposing the Secure Element when queried by an external smart card reader and thereby provides the same applications those are possible using actual smart card. In another mode, it can act as a card reader to read cards or initiate phone to phone communication using peer-to-peer mode.

NFC is being adopted by mobile phones for multi application scenarios and backward compatibility. Different components of the system allow multiple players to interoperate and provide benefits to the whole eco-system. Various architectures are defined for NFC enabled mobile phones. Value chain and

eco-system evolved around those. Different modification in architecture has been done and which leads to changes in value chain and eco-system. Following subsections describe the architectures defined initially for NFC enabled mobile phones.

4.1 Secure Element coupled to the NFC IC in Mobile Phone

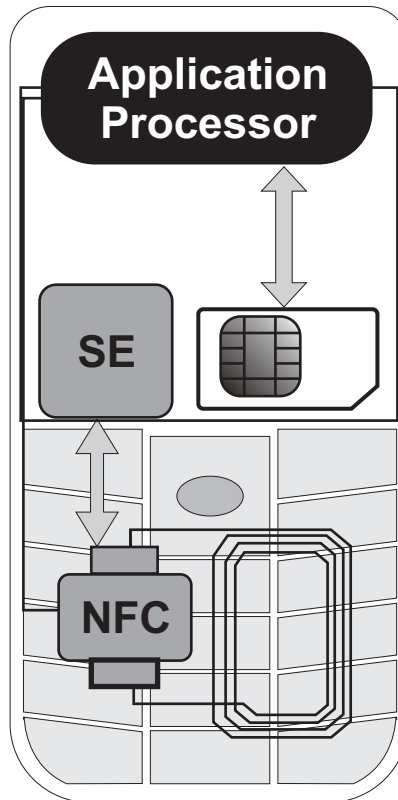


Figure 3: Mobile Phone Architecture where Secure Element coupled to NFC IC

Figure 3 shows the NFC enabled phone architecture where secure element is embedded in to the phone through proprietary connection between NFC IC and secure element. UICC does not have any connection directly with NFC IC.

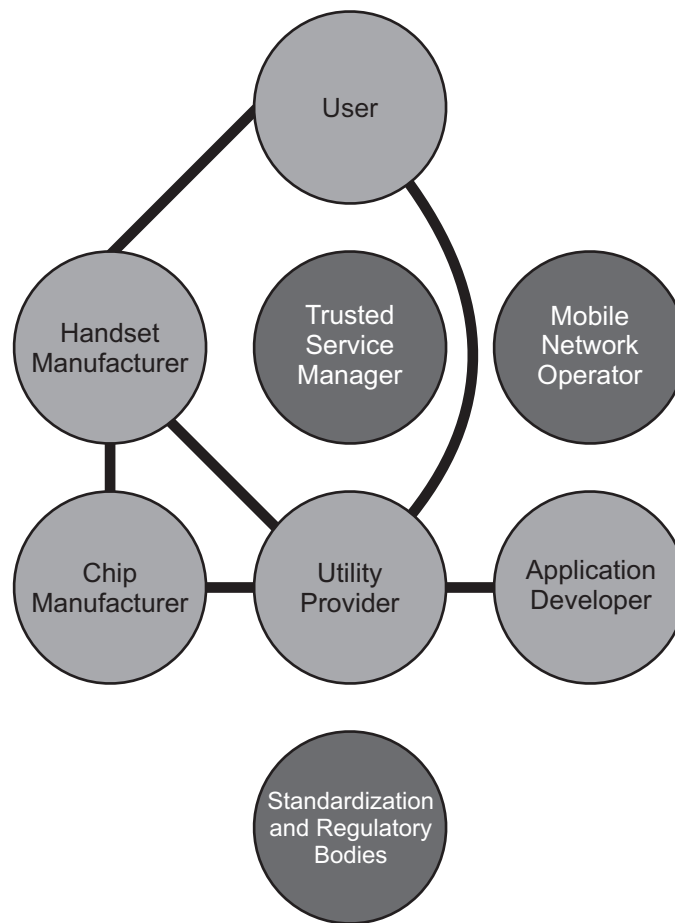


Figure 4: NFC Eco-system for Embedded or SD and MM Card as secure element

Figure 4 shows participation of the players in the eco-system for this architecture. Utility provider directly have to interact with either chip manufacturer or phone manufacturer to deploy the application on NFC enabled phone because secure element is embedded in the phone while production of the phone. As shown in figure the eco-system does not include players like Trusted Service Manager, reason utility provider directly deploys the application. Also, it does not include mobile network operator or any standardization and regulatory bodies. It is possible that utility provider can directly provide the application to user if utility provider has access to proprietary secure element and connection to NFC IC.

This solution becomes specific to a mobile phone or vendor of mobile phone which limits the market penetration of the NFC applications through mobile phone. This architecture puts Chip manufacturers and Handset Manufacturers in dominating position in NFC eco-system but market reach-ability and high volume deployment is compromised because of proprietary solutions and dependency of applications on mobile phone model or vendor. Although proprietary by architecture, this model has been effective in bringing NFC technology to the end user.

4.2 SD or MM card as Secure Element

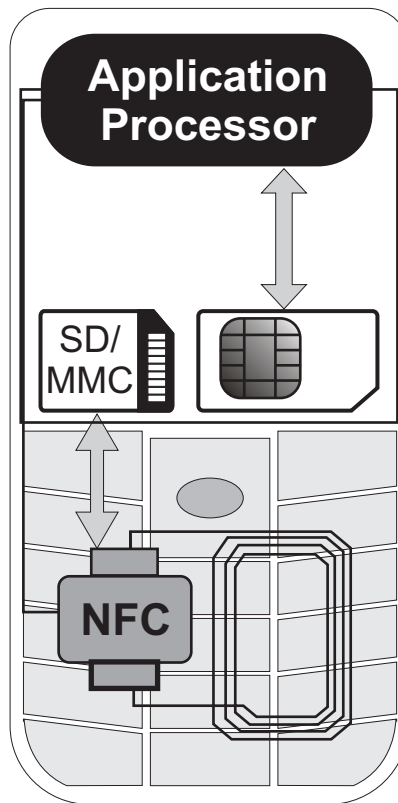


Figure 5: Mobile Phone Architecture where SD or MM card as Secure Element

Figure 5 shows architecture of NFC enabled mobile phone system where SD or MM card work as removable secure element, but this architecture also does not have UICC connection with NFC IC. Figure 4 shows participation of the players in the eco-system for this architecture.

This architecture has standardized interface like I2C or SPI with the NFC IC. It allows utility provider to directly interact either with chip manufacturer or handset manufacture or to user. NFC applications can be independent of secure element or connection to NFC IC. Here also, as shown in figure it may or may not include players like Trusted Service Manager because utility provider directly deploys the application or through a Trusted Service Manager. Also no mobile network operator, standardization and regulatory bodies are a player in this eco-system.

Non-proprietary nature of SD or MM card as secure element and connection to NFC IC, the NFC applications can be ported to any NFC enabled mobile phone. On other hand deployment of the applications can be either done by chip and handset manufacturer or by utility provider by directly dealing with the end user. Deployment of the application is still not possible dynamically, when and where the user wants it, which limits the market penetration of the NFC applications through mobile phone.

This architecture puts utility provider along with Chip manufacturers and Handset Manufacturers in dominating position in NFC eco-system but market reach-ability and high volume deployment is compromised because of not easy deployment of the applications on mobile phone.

NFC on Mobile Phone Non-Proprietary Standards based System Architecture

Driving factors for the NFC eco-systems are mutual interests of the NFC eco-system players and dependencies on each other. User expects convenient, user friendly and secure services with support of multi-application on single NFC enabled mobile phone without any constrain of mobility and area of service. Handset manufacturers want to make their mobile phone more appealing with the NFC support and extendibility of the services and applications. On other hand utility providers like Banks and Transport Companies who have existing infrastructure want to maximize the use of the existing infrastructures, which are already deployed using different reader technologies. Utility providers want to expand the business with deploying there applications to many users. Mobile Network Operators, who provide the medium for service delivery, have long-standing customer relationship and want to leverage that for providing these new mobile contactless services.

All this is only possible when everyone came together through Standardization and Regulatory Bodies to defined non-proprietary standards. In case of NFC, ETSI Host Controller Interface (HCI) and Single Wire Protocol (SWP) are the standards for interfacing UICC with NFC IC (NFC Controller) and other contactless ISO standards which enable seamless integration of NFC on mobile with existing base of reader infrastructure.

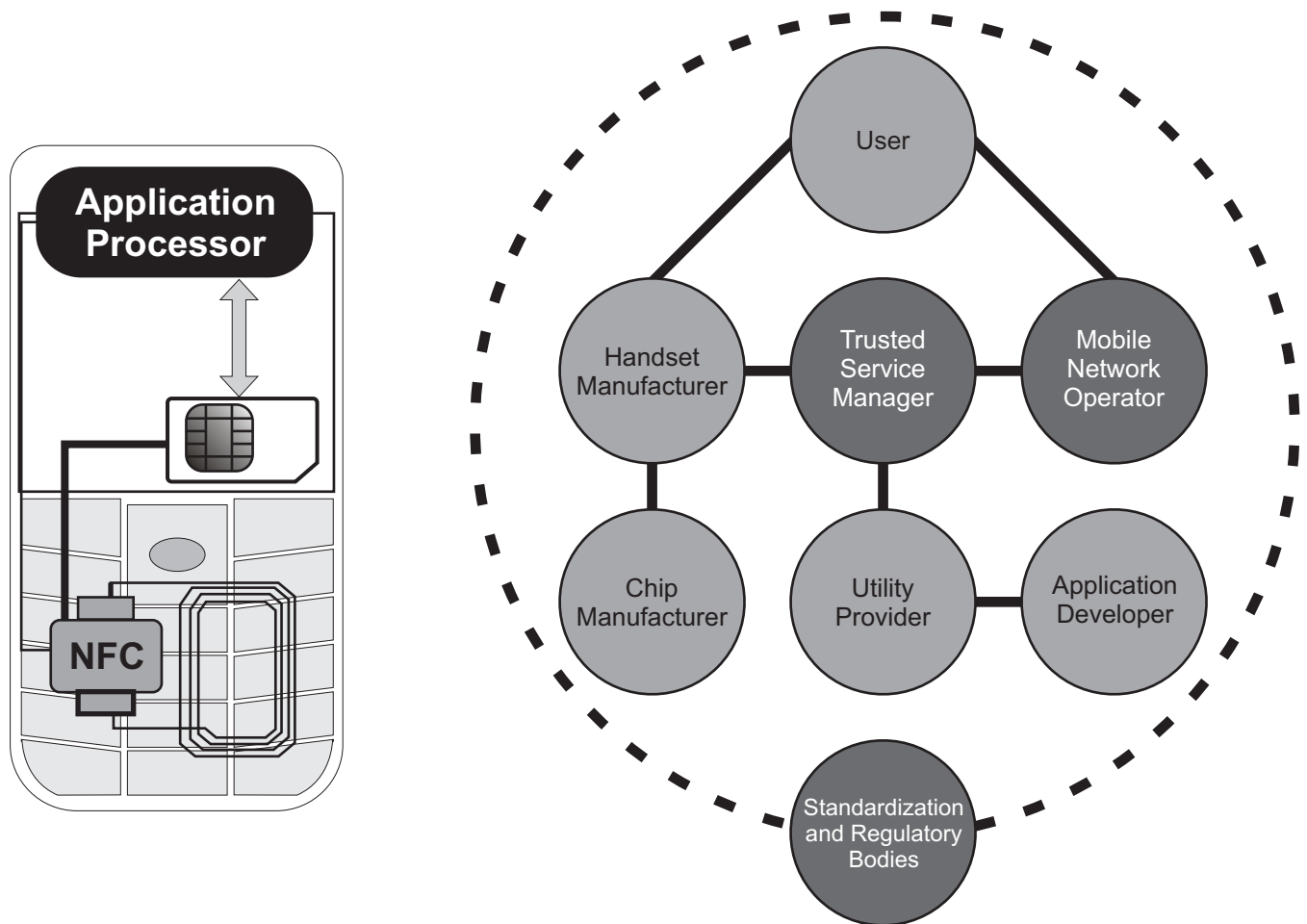


Figure 6: Mobile Phone Architecture and Eco-system where UICC as Secure Element

Figure 6 shows the NFC enabled Mobile Phone with UICC (SIM) as Secure Element. In this architecture, HCI provides the interface for interaction of a UICC host with a NFC IC or the host controller. UICC is physically connected to NFC IC through SWP. In such a NFC enabled device, typically one or more hosts connect to the NFC IC (also called the Host Controller). The mobile baseband or application processor is one such host and a SIM Card (UICC) is another such host.

As shown in Figure 6 there are lot more players in eco-system with UICC as secure element in NFC enabled mobile phone architecture. NFC applications are hosted in UICC which is acting as secure element. Those applications can be deployed remotely through mobile phone network using services of Trusted Service Manager. Non-proprietary standards of the UICC and SWP allow applications to be deployed in any NFC enabled mobile phones over existing customer base of Mobile Network Operator. Adding to all of these, the end user gets this new set of services practically at no extra cost.

This architecture provides market reach-ability through large existing base of mobile service subscriber with Mobile Network Operator. There is also dedicated entity of Trusted Service Manager who manages the application deployment and management, which does not require utility provider to go to each customer. Also architecture allows same NFC application over different NFC enabled mobile phones.

Deployments

Encouraging signs of market take up with first commercial launches and trials proving customer acceptance in various regions worldwide. Now many leading mobile network operators, banks, retailers, transport operators and others have finalized their NFC plan for the coming years. Along with them many chip and handset manufacturers have already ramped up their production for NFC ICs and NFC enabled mobile phones. Main driver from manufacturing of NFC ICs are NXP Semiconductors, Inside Contactless, Innovision (recently bought over by Broadcom), ST Microelectronics and other semiconductor companies. Nokia, Samsung, LG, and other leading handset makers are announcing NFC integration on mobile phone platforms for future years. Orange, Vodafone and O2-Telefonica are the main Mobile Network Operator drivers of NFC deployment in Europe. NFC is benefiting from existing contactless payment infrastructure as a main driver of NFC deployment in the US.

At the same time NFC Forum membership is increasing. Involvement of GSM Association in NFC roll-out and active endorsement to have NFC technology in mainstream mobile phones by using the standardized SWP and HCI gives a big thrust to NFC.

Now field proven solutions are available with more than 150 trials and first commercial deployments in Austria, Germany, India etc. which are listed below:

- Guidance and information was provided through NFC on NFC enabled mobile phone under “NFC Parcours Princesse Grace Monaco” with cooperation among Monaco authorities, Nokia, NXP Semiconductors.
- Transport ticketing field testing was launched for an NFC system based on Germany's VDV contactless ticketing standard in January 2009 with efforts of ÖBB Austrian federal railways group, Mobilkom Austria.
- Reslink deployed the NFC solution in Finland with Nokia, which is NFC based time and attendance and location sensitive data capture solutions. It provided guaranteed proof that employees were at a particular location and what they were doing whilst there simply by touching a location tag with NFC enabled mobile phone.
- In November 2008, a “Touch 'N Go Event Solutions” was deployed by ITN International, NXP and

Nokia in Boston, USA. The event was using 500 NFC enabled Nokia 6212 mobile phones to wirelessly scan visitors' NXP chip-equipped badges, to collect contact information and to conduct surveys.

- An NFC trial was performed in Romania in December 2008 by ING Bank with Master Card and Nokia, involving five hundred ING clients in Bucharest testing the mobile version of MasterCard's Maestro PayPass, a contactless prepaid payment product designed for small purchases.
- Multi city NFC trials are started by Sheetz convenience stores, Wright Express Corporation and ViVotech in USA, which enables drivers to make fuel purchases at Sheetz locations using their NFC enabled mobile phones.
- Kasikornbank (Thai Farmers Bank) along with Visa, started Mobile payment and banking through NFC enabled mobile phone in January 2009 in Thailand.
- Citibank started tap and pay, mobile payment through NFC enabled mobile phone (Nokia 6212) with Vodafone subscription in Bangalore, India in October 2009.

NFC, Going Ahead

At the annual smartcard show Cartes, in November 2008, NFC was seen everywhere and participants' interest was very clear. IC manufacturers like NXP, Infineon, Inside Contactless had featured NFC. Supporting to them, UICC manufacturers such as Gemalto, Oberthur, G&D etc. demonstrated their NFC capabilities along with entities like Visa and MasterCard. Availability of the NFC enabled mobile phones and other devices in high volumes will lead huge market in coming years and will create opportunities across payments, service discovery, transport, ticketing, etc. Mobile phone manufacturers have started putting NFC capabilities in low end mobile phones which will increase NFC penetration.

According to a press release from Nokia, all new Nokia smart phones will come with NFC from 2011.

NFC Forum has announced liaisons with GSMA, Mobey Forum, ETSI, Smart Card Alliance and those are acting as the key to building out the eco-system and ensuring interoperability. They have introduced a new Implementer level of membership to attract business interests and vertical market players. According to plan of NFC Forum, the compliance process should be available during Q4 2010, which will provide vehicle for interoperable NFC eco-system to grow.

ABI research also considers NFC in its forecast of 20% increase in wireless IC shipments in year 2010. According to them NFC chipset shipments and revenue will continue to grow steadily over the next five years, as the market adapts to this new technology. According to them different types of NFC deployments will drive significant NFC uptake, and total NFC ICs will approach around 300 million shipments in 2015.

In summary, the stage is all set for NFC mass roll out with the major hindrances being addressed. Not only the NFC architecture with UICC but all three architecture models will co-exist for some time, feeding on each other, providing more and more intuitive applications to the user and possibly merge over a period of time as standards evolve and get deployed.

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Mobile Unified Communications and Challenges.

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Abstract:

To compete in today's business world, enterprises need to improve their internal and external communication flow between employees and customers and suppliers. This article unveils the basic Mobile Unified Communications application for enterprises aimed at improving relationships, interactions and communication. This paper aims to explain one of the mobile unified communication solution and the technologies used. This also reviews present and future needs of businesses for unified communications applications.

Introduction:

The desk phone is one of the first and most important productivity tools provided to workers by an organization for ensuring efficient business communication. Desk phones do a good job of meeting this need as long as the worker is sitting at his desk, which in today's business environment happens less and less frequently. Enterprises are seeking those intelligent mobile applications which have solutions for the key challenges in current business world like Mobility, responsiveness, customer satisfaction and cost optimization. However, emerging technologies, such as SIP (Session initiation protocol), VoIP (Voice over Internet protocol) are being used to develop a new generation unified communications and services that can help to face these challenges. And many of the unified solutions, that anticipate and meet these new requirements.

What is Mobile Unified communications?

Unified communications (UC) is the integration of real-time communication services such as instant messaging, presence information, telephony, video conferencing, call control and speech recognition with non-real-time communication services such as unified messaging like integrated voicemail, e-mail, SMS and fax. For example, unified communications technology could allow a user to seamlessly collaborate with another person on a project, even if the two users are in separate locations. The user could quickly locate the necessary person by accessing an interactive directory, engage in a text messaging session, and then escalate the session to a voice call, or even a video call or a voice mail all within minutes.

Mobile UC mobilizes the existing desk phone number to provide Business Voice on a smart phone and ties in secure IM with Social Networking (Mobile Presence and Status) to enable individuals to connect

on the first try. Importing contacts directly from the organization's active directory to provides one-click access to any member within the secure community directly from the smart phone interface.

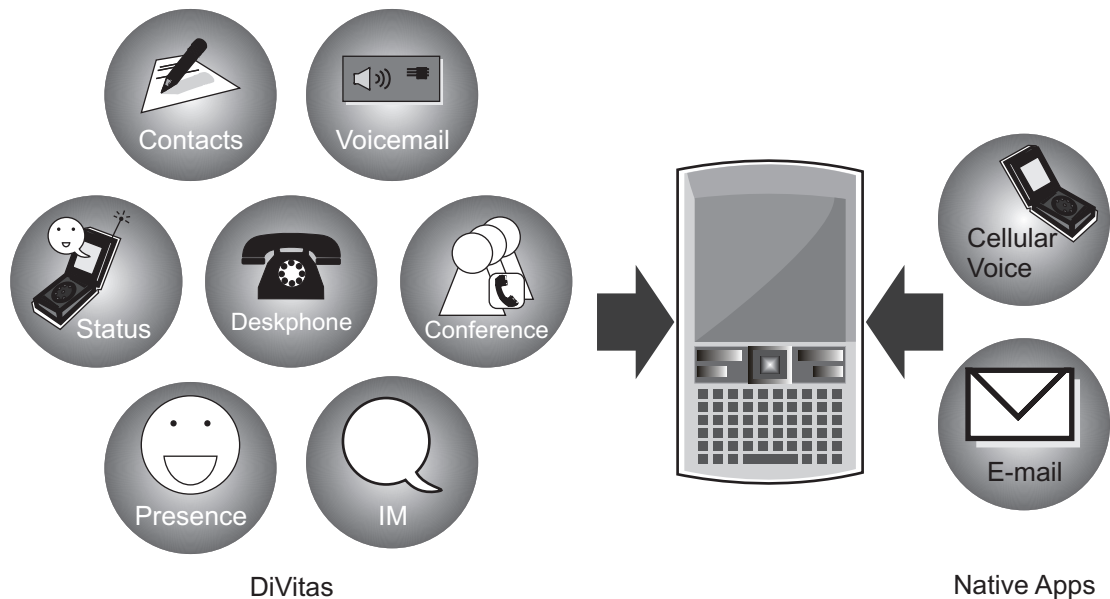


Figure 1: General Mobile UC Solution

The general Mobile UC solution consists of the Server, installed on the corporate LAN, and the Client installed on selected dual-mode smart phones.

Client:

Installed on the mobile handset (Android, Blackberry, iPhone, Nokia and Windows Mobile platforms) or any desktop that is capable of running the Firefox, Internet Explorer or Safari web browser. The client's easy-to-use, icon-driven interface enables users to navigate quickly to a rich set of business voice and Enterprise Social Networking capabilities.

The Client is a peer to the Server. It constantly monitors the viability of the active network connection and collaborates with the Server on network roaming decisions. Mobile UC provides IT control and management features typically not available on competitive Mobile UC products.

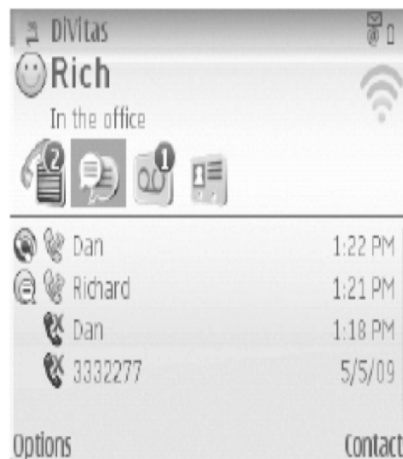


Figure 2 Enterprise Social Networking

Server:

Installed on the enterprise network, the Server provides an IT managed mobility service that integrates with the corporate PBX. Once installed, a smart phone handset now behaves as the desk phone. And business calls can now be initiated and received from a mobile handset using the desk phone number.

The Server monitors the network connections with Clients and proactively identifies the optimal wireless network for each call. Roaming decisions, between WiFi and mobile networks, are made automatically by the Server to sustain highest call quality and reliability. Unlike other dual-mode mobility products on the market, no end user action is needed to identify WiFi boundaries.

The protocol proxy, which is configured to manage connectivity between a mobility client of the handset and a mobility server within an enterprise. The client protocol proxy receives a plurality of client connectivity requests from a plurality of application clients. The server proxy is configured to manage the connectivity for the mobility server. The client and the server protocol proxies are configured to interact with one another to establish a secure channel.

Required ports:

The network firewall will need to allow traffic on the ports that are used by the server to support client users. For the unified solution to operate across a firewall, you must configure the firewall to forward traffic received on the following ports to the server.

- UDP 5064 - Channel assignment port. The request or response from/to client or server goes through this channel only.
- UDP 57342 - Media Stream Access Port (MSAP). This port number can be changed on the server. This port is used for actual real time streaming either audio or video.

SIP: Session Initiation Protocol:

SIP is a text based protocol that can establish, modify, and terminate multimedia sessions such as Internet telephony calls (VOIP).

SIP supports five facets of establishing and terminating multimedia communications:

1. User location: determination of the end system to be used for communication.
2. User availability: determination of the willingness of the called party to engage in communications.
3. User capabilities: determination of the media and media parameters to be used.
4. Session setup: "ringing", establishment of session parameters at both called and calling party.
5. Session management: including transfer and termination of sessions, modifying session parameters, and invoking services.

SIP messages can be transmitted either over TCP or UDP. SIP messages are text based and messages can be request or response messages.

Request message has the following format:

Method Request URI SIP version

Method:

The method to be performed on the resource. Possible methods are Invite, Ack, Options, Bye, Cancel, Register.

Request-URI:

A SIP URL or a general Uniform Resource Identifier, this is the user or service to which this request is being addressed.

SIP version:

The SIP version being used.

The format of the Response message header is shown in the following illustration:

SIP version Status code Reason phrase

SIP version:

The SIP version being used.

Status-code

A 3-digit integer result code of the attempt to understand and satisfy the request.

Reason-phrase:

A textual description of the status code.

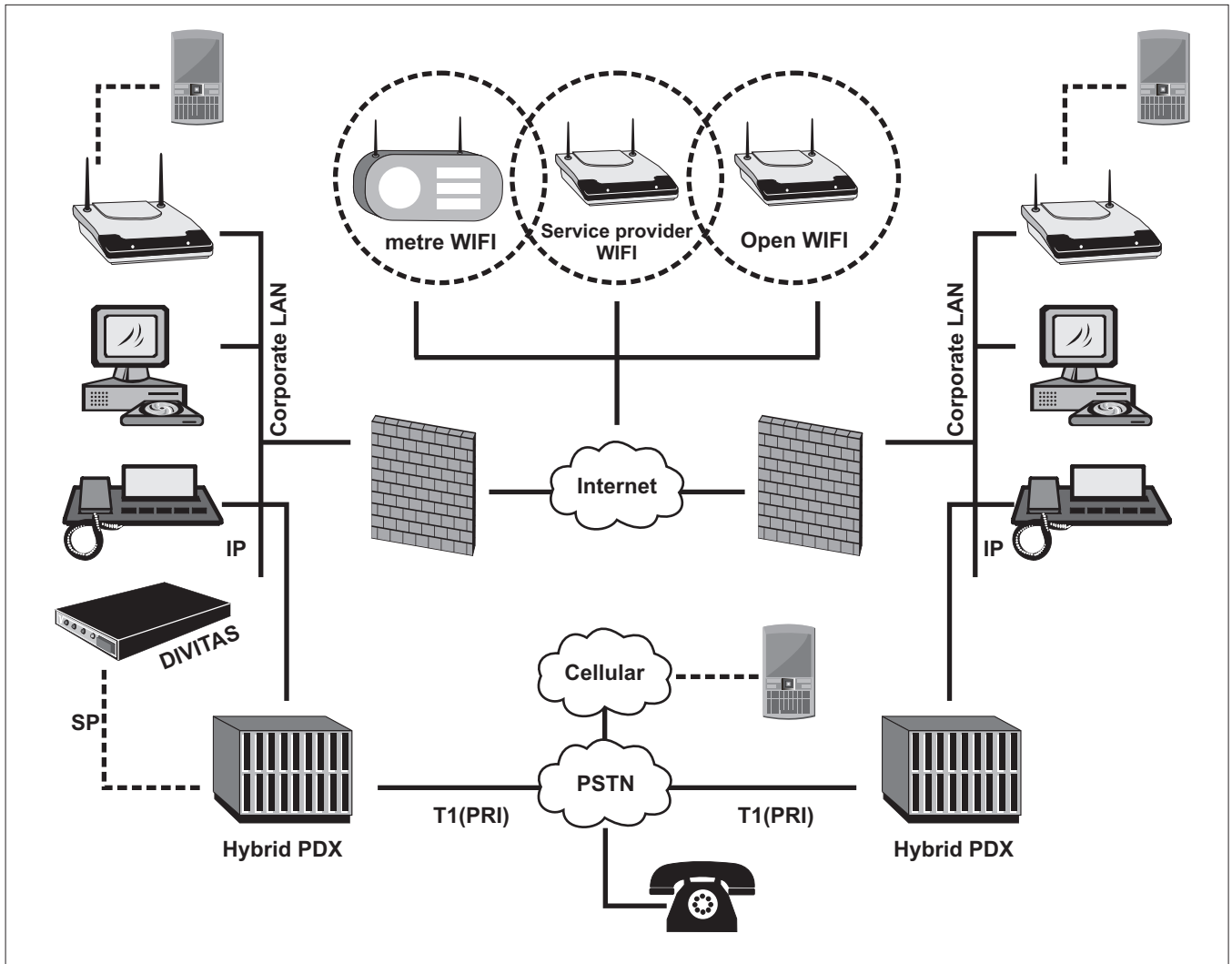


Figure 3: Unified Communication Solution

Social Networking:

Social Networking applications provide information about an individual's preferred mode for contacting them. Increasing awareness before a call is placed enables individuals to connect to colleagues on the first try.

Mobile Presence:

Standards-based presence information is managed for the Client not only to report availability but also reachability mode (i.e., voice and/or IM). A user sets their availability preference by selecting the desired option on the availability screen. Other clients within the secure community will display this dynamic information in their unified contacts list. The only exception to this is when on a call. Presence changes dynamically when a user receives a phone call and then again when the call terminates.

Status Message:

In addition to Mobile Presence, a user can add more information about their state; or broadcast a statement by customizing their Status Message. Once set, other clients within the secure community will display this dynamic information in their unified contacts list. Customized Status messages can be added to provide more detailed information.

Mobile Presence and Status greatly improve the efficiency in the way people communicate by allowing the highest possible success rate for connecting to other users.

Key benefits in Mobile UC:

- Actively engage with others.
- Connect to others on first attempt.
- Stay connected and engaged.
- Work seamlessly over any carrier like WiFi or GPRS.
- IT control and management features for enterprises.
- Cost effective solution.

Mobile UC Features:

- Instant messaging & presence.
- Multi-call Support
- Call control & conferencing.
- Ring groups.
- Device toggling.
- Ring groups.

Device toggling is an interesting feature. The unique “Toggle” feature supports moving a call between the device and its associated IP desk phone and vice versa. An example of when this feature is particularly helpful is if a user accepts a call on a mobile phone while en route to the office. Once in the office, the call can be toggled from the mobile phone to the desk phone if desired without call interruption. The same is possible in reverse - a call can also be toggled from the desk phone to a mobile phone at any time.

Conclusion:

In today's business world, so many competitors are working on these unified communications like Avaya, Cisco, Alcatel, Varaha systems, Agile to provide a reliable and cost effective solutions and to grab more customers for their business. The business of any enterprise involves extensive relationships and interactions with customers, suppliers and employees. To compete in today's competitive business world, to meet the changing needs of customers, to improve internal and external communication flows, and to face new challenges (eg: mobility and responsiveness), enterprises will need to implement major changes to their communication systems and need to work on latest future-proof technologies.

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Managed Services: Analyzing Strategic Potential in Emerging market

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Introduction:

In today's market place, Managed Services fulfill the needs of quality of service, bandwidth availability, and security. Amidst an increasing demand for Managed Services in Asia Pacific, a variety of market participants are emerging to offer security as a service and tap into this lucrative market. Some telecom companies have been relatively slower in positioning themselves as serious competitors in this space. This market insight examines why these companies will eventually become the front end for providing managed services to the mass market and explore the implications for the other participants in this growing market.

Background:

This study was conducted for a major regional provider of Managed Services and the finding can be extrapolated to other regional players as well. This paper examines the business questions around the changing trends in the market with the following focus:

- The research gives an insight on the potential for managed services with corporate clients.
- The pattern in which bandwidth is subscribed to.
- A comparison to awareness and experience of managed services.
- The likeliness of being associated to Global SPs, Regional SPs & In-Country SPs.
- The value proposition provided by Service Providers.
- The churn probability & risk.

Methodology:

To address the objectives within the agreed budget and timescales, a program of in-depth telephone interviews, personal interviews and online interviews with IT decision-makers and key end-user influencers of demand at major IT/ITeS and Consulting companies within target vertical market was conducted.

Working closely with the above organizations, we developed a semi-structured questionnaire for in-depth interviewing and probing on issues faced by end users. The semi-structured questionnaire enabled us to collect quantitative data as well as probe on qualitative issues, attitudes and perceptions by influencers.

A sample was then developed and cross matched with an extensive database of IT end-user establishments and decision-maker contacts with the help of which a total of 58 in-depth interviews in various forms were undertaken during this project with the respondent groups.

Bandwidth - Subscription Pattern:

Today enterprises are looking for options to cut costs without compromising the future viability of their business. At the same time they are also finding it difficult to manage networks effectively in the face of increasing network complexity.

In the past, organizations gave little consideration to the administrative costs, costs of internalization of day to day management activities. Now these costs are prohibitive and are continuously rising due to reducing upgrade cycles for new technologies, increasing training costs and the need to develop in house expertise on a wide range of technologies.

To understand this need an analysis was carried out from the sample selected to study the expenditure and bandwidth subscribed.

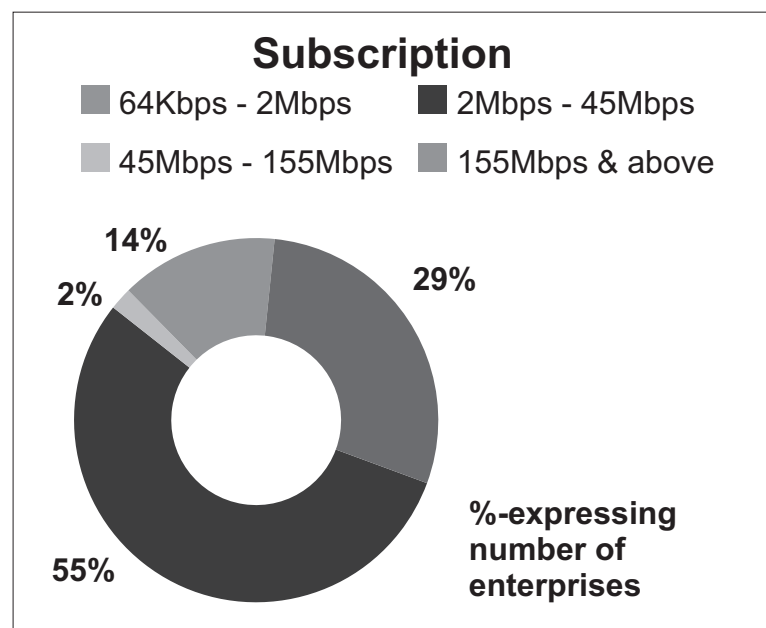


Figure 1: Breakup of expenditure & bandwidth subscribed

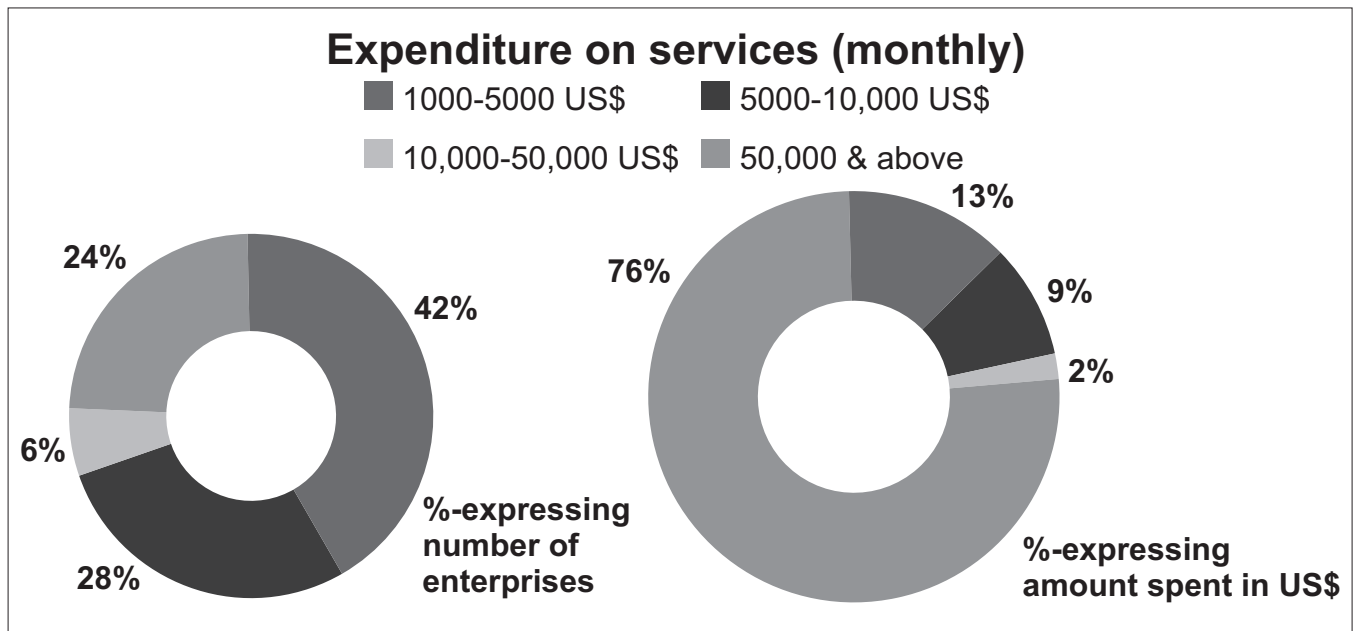


Figure 2 : Share of the monthly expenditure incurred in Managing Network Services.

Key learnings:

- The major stake of the pie remained within the usage of 2 Mbps-45Mbps bandwidth showing a scope for strategic penetration for the Service providers with their existing product portfolio.
- It was found that 84% of the market lies with the subscription of bandwidth less than 45Mbps. Only 16% were found to be high bandwidth subscribers.
- 70% of the subscription ended up in spending less than US\$10000
- 24% of the total subscribers contribute to 76% of the total spend and 70% of the subscribers contribute to 22% of the total spend.

Managed Services Awareness:

The overall analysis targeted organizations from the following major domains:

- BPO/KPO
- IT/Software Services
- Telecommunication/Mobile
- IT e-commerce
- Banking
- Consultancies

Through our research, it was found that major chunk of managed services business was driven by the basic internet usage followed to some extent by MPLS. In spite of the fact that customers have awareness of other products they do not have experience of usage of these products. And so, there is

room for increasing customer awareness about the potential benefits of the operator's other products so that customers actually use them.

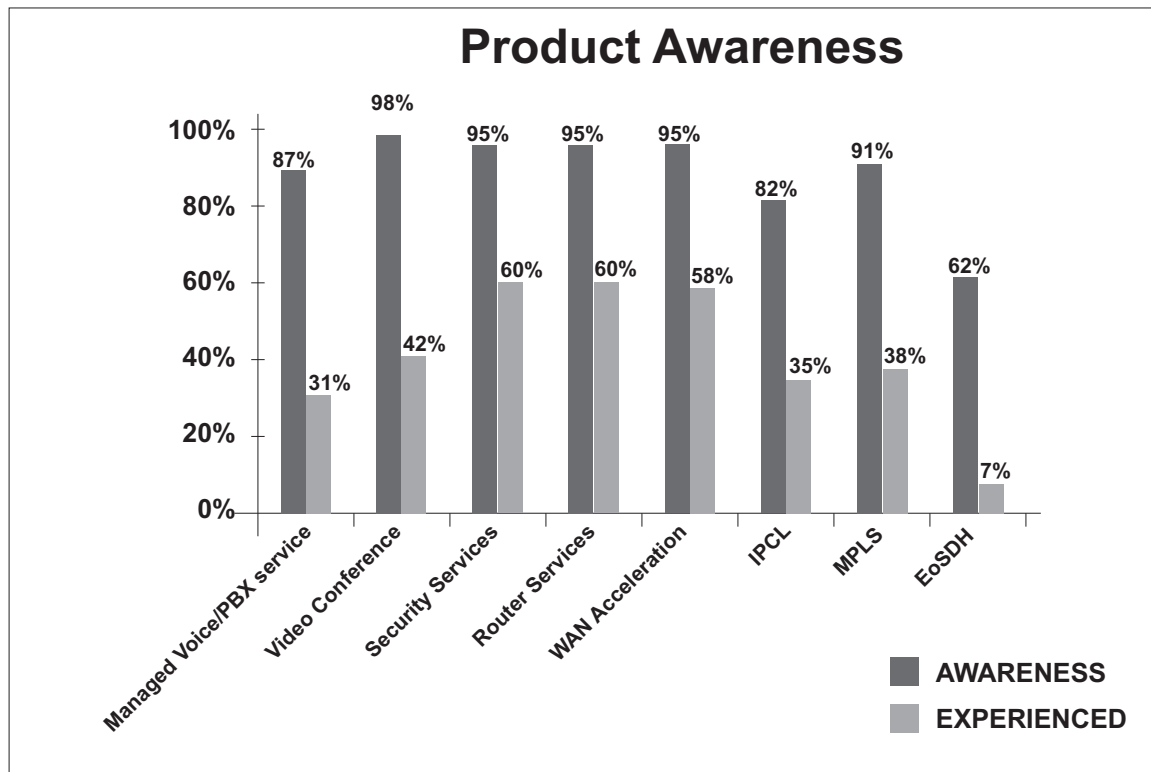


Figure 3 : Customers' awareness about various products.

Key learnings:

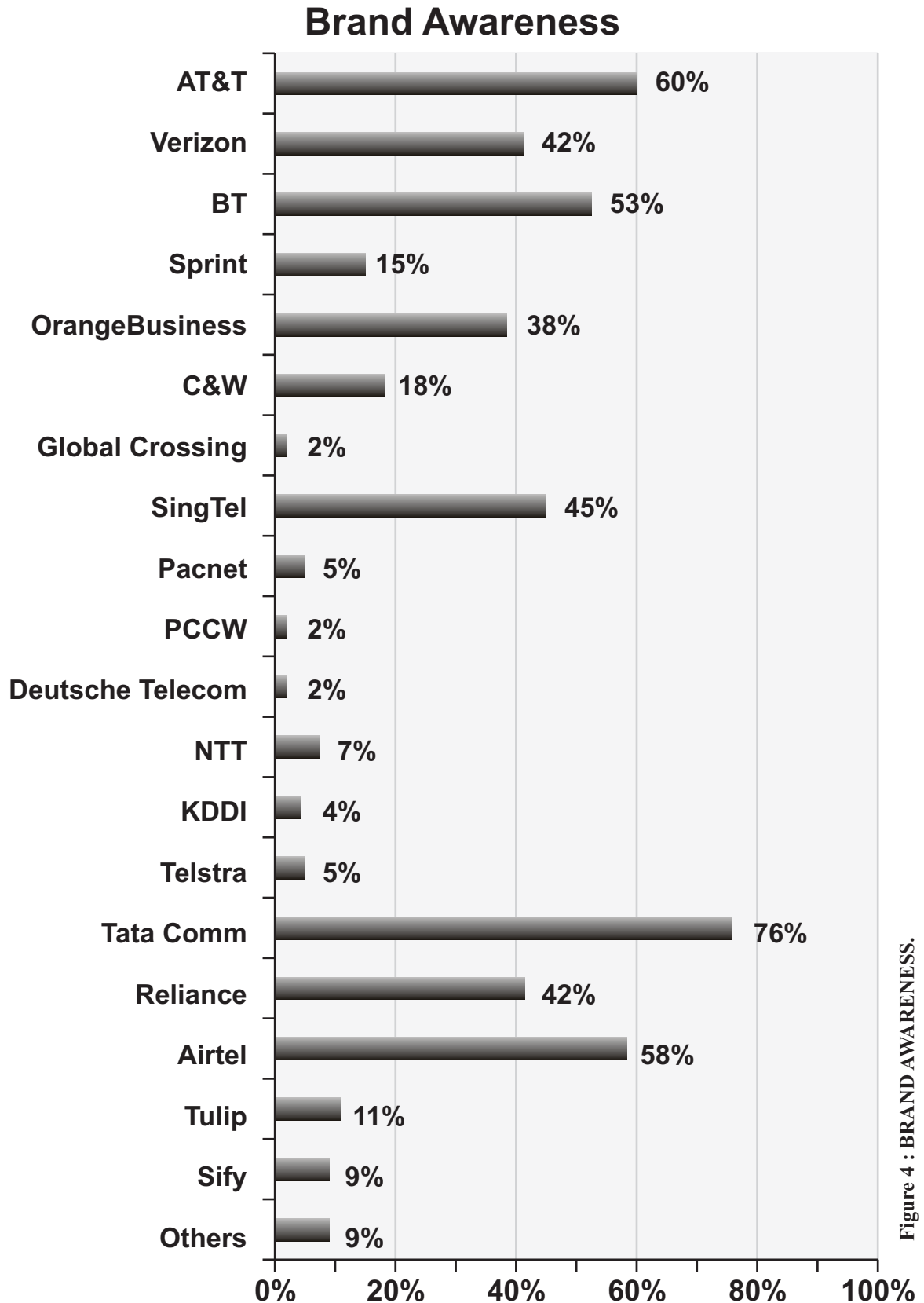
- There is a ready availability of awareness on Managed Services and International Private Bandwidth Services
- Concept Selling is not a major requirement in the sales process
- Experiencing managed services on International Private Bandwidth Services is low as majority is being experienced on Domestic/Internet platforms

Brand Awareness Reaping The Benefits:

Our study clearly indicates that customers showed likeliness of being associated more to the Global Service Providers' in comparison to the Regional Service Providers'. However, the overall brand visibility is higher of the In-Country Service Providers. Hence, for operators who operate in the regional area eg. APAC region, this may be acting as a hindrance for them to get an entry into the GSP category.

Major reasons for continued association as per the customers are quality and pricing, of which SingTel by far rules the quality market but at times falls apart in the pricing strategy. Only 45 % of the total respondents had their likeliness of association with the operator.

The influx of different market participants offering managed services is clearly visible from the table shown below.



Key learnings:

- The market showed likeliness of being associated more to the Global Service Provider(GSP)s in comparison to the Regional Service Provider (RSP)s
- The overall brand visibility still remained with the In-Country Service Providers.
- Huge scope to increase brand awareness

Value Proposition:

Comparing the below mentioned parameters on a Likert scale model, it was found that the operator's services and the pattern of the graph was on par with its competition in pre-sales support, operational support, reliability and scalability. The more prominent factors strengthening the operator's visibility and quality were its point of presence and superior project management capability.

The respondent feedbacks also highlighted some key areas of improvement which would further enhance the brand image of the operator.

- Limited Scope: In terms of lack of strong presence beyond the Asia Pacific (APAC) region.
- Customized Approach: More flexibility

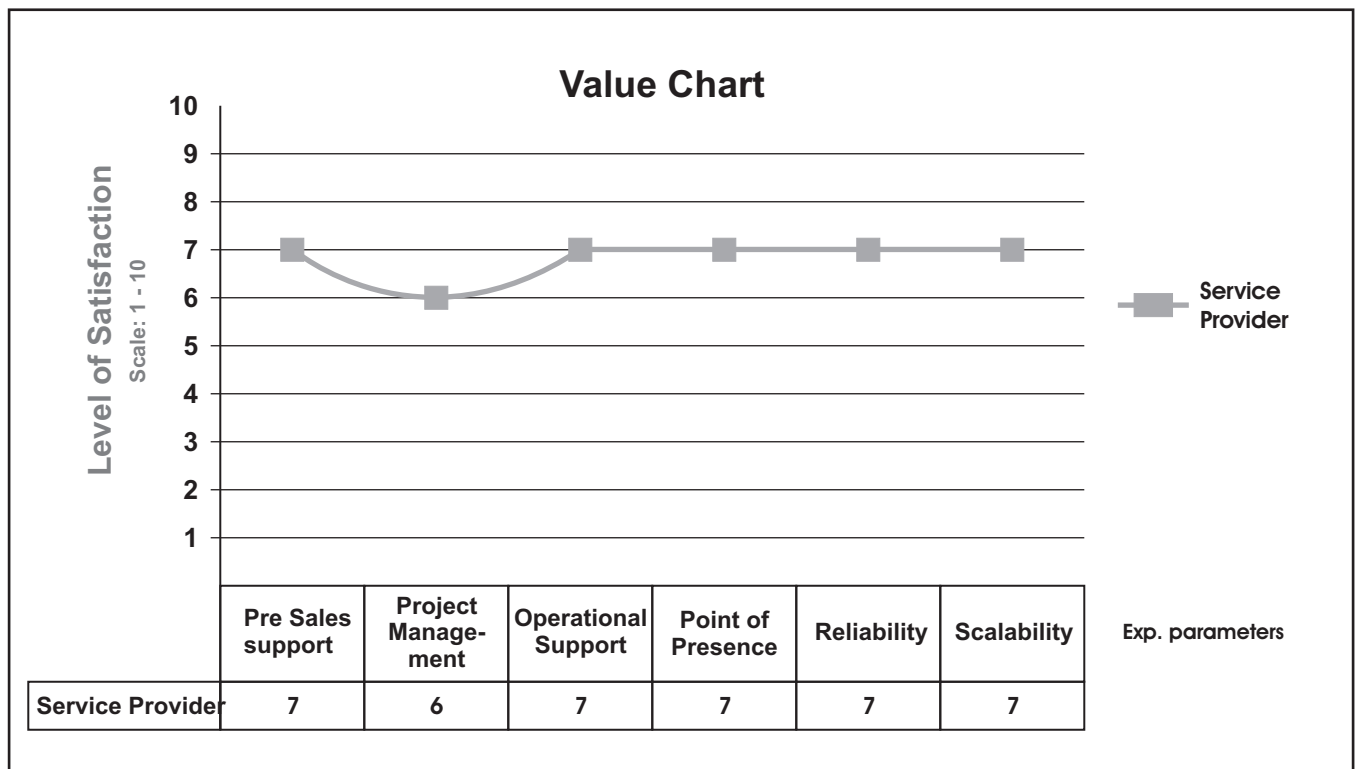


Figure 5 : Level of Customer Satisfaction.

Key learnings:

- The operator's position is better or at par with the market in terms of its value
- Sustaining and enhancing values can create a differentiator for the operator

Churn Probability & Risk:

In order to understand the potential for operator's growth an overall level of satisfaction was studied comparing it with its competitor.

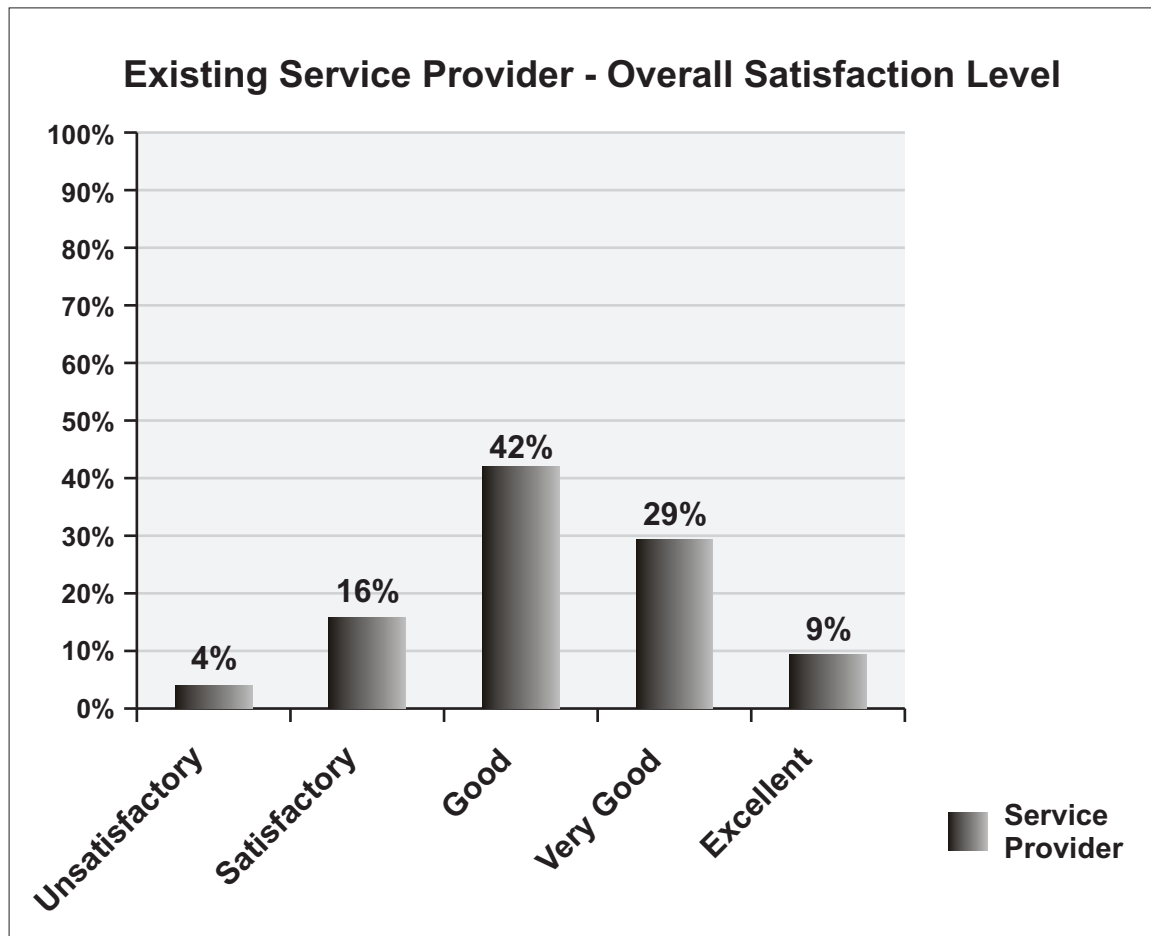


Figure 6: Overall level of Customer Satisfaction with the existing service provider

%Age competitor	Type	Remarks
38	LOYAL	The operator leads the pie in building loyal customers
42	NEUTRAL	A huge portion lies with the competition which can be driven to the loyalty side
20	HIGH RISK	Major risk lies within operator's boundaries

Percentage classification of customers

Key learnings:

- The operator had a significantly high hold in building loyal customers.
- On the other side risk of losing existing customers to competitors was very high.
- A major chunk in the market still had churn capabilities.

Conclusion:

The managed services business model is no longer in doubt. It is no longer a questionable business practice and indeed could be labeled a worldwide phenomenon. Companies of all different shapes and sizes are entering the managed services marketplace. Market competition is ever increasing as different types of participants enter the market and offer services in multiple forms. Initial adoption of these services is mainly from large enterprises that seek strategic planning, best-in-class services and cutting edge technology capabilities. Small and medium enterprises, which are highly price sensitive, make up the majority of companies in most countries around the region. These companies are still slow in adopting these expensive specialized services, and are more likely to use the basic internet from their telecom service providers. However formulating upcoming technology to business strategy plays an important role. Transforming an organizations business environment via a strategic sourcing partnership with best-of-breed vendors, it becomes imperative to articulate a clear vision of what 'technology transformation' should encompass. But as companies gradually mature in their understanding on the importance of Managed Service and the benefits of outsourcing, it is expected that the scope would rise from large enterprises to small and medium enterprise.

Despite the ability of managed services to deliver robust solutions to virtually anywhere in the world, many of today's clients still demand a human presence to accompany the IT service they are consuming. Add to the mix the fact that many corporations today are growing and expanding their operations to far reaches of the globe making their IT partners a necessity in those expanded regions.

No matter what the motivations are, the inevitable conclusion is quite clear when it comes to partnering as the critical question still remains unanswerable, when will enterprises understand that need and properly exploit it to bring realistic value without upsetting the balance.

Abbreviations used :

IT/ITeS- Information Technology / Information Technology enabled Services

BPO/KPO- Business Porcess Outsourcing / Knowledge Process Outsourcing

MPLS- Multi Protocol Label Switching.

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The Evolving Handset Market in India: A study of facts with reference to tier 2 & 3 cities

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Abstract:

In recent times, we have witnessed that companies of Indian and Asian origin have introduced handsets into the market. These handset companies have acquired the market pie through low cost and innovative handset models. Mobile handsets are now established as the fourth screen after Multiplexes, Television and PCs, multimedia featured mobile handsets at affordable price are the new hot cakes in Indian Market.

A study conducted in Lucknow and Bhopal by MediaTek suggests present scenario of the handset market and how it is likely to shape up in the time to come. This paper presents the expectations of end consumers from mobile handsets in terms of price, brand, after sales service, features, shelf life and resale value. Paper lists factors of motivation for a Mobile handset retailer to push a particular type of brand.

It discusses factors that influence buying decision of the end consumers in tier 2 cities while buying a new handset. It aims to discuss the change in the market composition, also how the affordable handsets would help in increasing the wireless teledensity.

This paper concludes with discussing the future of mobile handsets market in India with the advent of 3G and BWA in India and hence the influence of mobile applications “meant for the masses” and their integration with handset platforms.

Introduction:

India, the world's fastest growing telecommunications industry with 688.38 million telephone (landlines and mobile) subscribers and 652.42 million mobile phone connections (as of July 2010), is a tough battleground for biggest mobile handset makers.[2] Teledensity of urban areas is about to reach 100% and the growth in handset market thereafter, will come majorly from the rural India. The primary need is to provide innovative and multiple functionality handsets at affordable prices.

The low cost handset brands which recently entered the Indian market seem to cater to the low cost need of rural India.

Homegrown handset makers captured 14% of the mobile phone market in India in FY 2009-10, thanks to the burgeoning growth in the cellular telephony, says a survey.[1] These manufacturers had just 3-4 per cent market share in the previous fiscal. These Indian brands strengthened their presence in the domestic handset market in 2009-10, growing at noticeable rate.

According to a market intelligence and advisory firm IDC India, the shipments of mobile handsets in India grew by 6.3 per cent (QoQ) in the second quarter of 2010, ending June 30, to touch an all-time high of 38.63 million units in a single quarter. Compared to the second quarter of 2009, there has been a 60.1 per cent rise in terms of unit shipments in the second quarter of 2010.

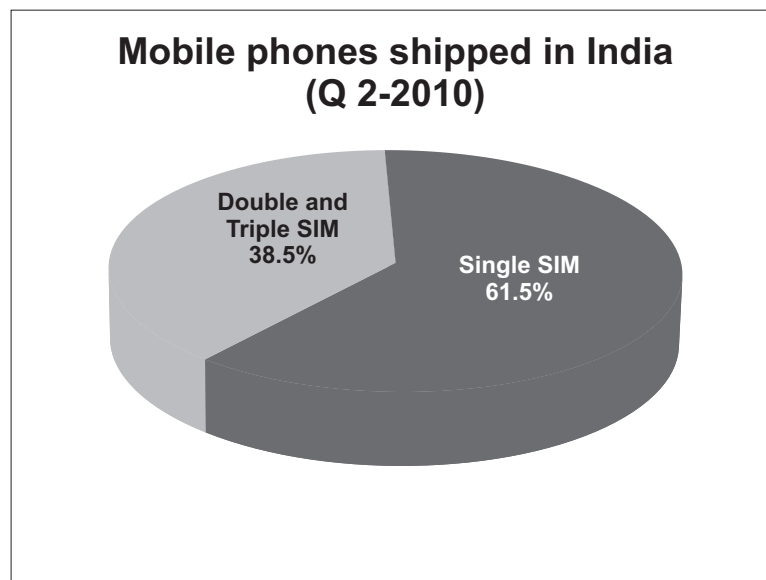


Figure 1: Breakup of Mobile Phones

The dual and triple-SIM (Subscriber Identity Module) card slot phones have grown to touch as much as 38.5 per cent of the total India mobile handset shipments, from less than 1 per cent during the April-June 2009 quarter."In the recent quarters several new design houses successfully launched their own devices at significantly lower Average Selling Values (ASVs) in the price sensitive India market. Such handsets found ready acceptance amongst first time buyers, especially from small towns and villages, says a report by IDC India released in September 2010.[2] Many design houses of handsets that are catching up fast with the existing global brands in the Indian market according to the reports, to name a few.

Micromax:

Indian brands are now giving a tough competition to foreign brands in terms of price, handset models and services. The Rs 50,000 crore (Rs 500 billion) handset market in India has seen new vendors rise to 28 from only five players in January-March 2008 quarter. Micromax plans to sell six million units this year. About 80 per cent of companies' sales is driven by rural India. The company has presence in Sri Lanka, Hong Kong, Dubai and Nepal. [2]

Spice Mobiles:

Spice Mobiles is a part of Spice Tele ventures, the telecom vertical of the diversified \$2 billion Spice Global group India, selling nearly 1.5 million mobile handsets per quarter.

The company with 25 handset models is targeting 1 million handset sales per month. Spice Mobiles is the first Indian handset manufacturer to begin its local production at Baddi, Himachal Pradesh in March 2010. Spice Mobiles has also enhanced its presence outside India with entry into Bangladesh and Nepal, now plans to enter the African market. [2]

On the same lines, other design houses like Lava, Maxx, Zen, Lemon are also catering to the rising demand of low cost multimedia handsets with multiple SIM slots. The market competition among this category is high. This is because differentiating becomes tougher in the ongoing price war, between these design houses.

Consumer behaviour towards low cost Mobile handsets:

The consumer class living in tier 2 & 3 cities and rural India are responding well to the complex multimedia phones and are comfortable using multiple functionalities. In this report the tier 2 cities refer to the likes of Lucknow, Bhopal, Nagpur etc. and tier 3 refers to even smaller cities like Manmad, Jhansi, Bareilly etc. Functionalities like video player, dual SIM, high volume speakers, Bluetooth, with sufficiently long battery backup are attracting mobile buyers.

A recent survey conducted on consumer behavior in the rural market by MediaTek India Technology, a fabless semiconductor company for wireless communications. This survey was conducted in the month of December 2009 across 40 villages near Delhi/NCR.[3] The study revealed that decision making in the rural segment is more dependent upon peers, colleagues, and personal experience for a particular mobile handset.

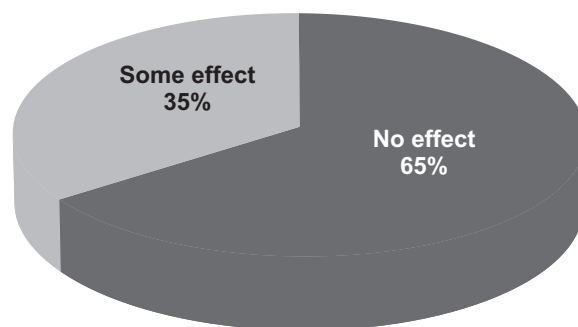


Figure 2: Effect of advertisement on Rural buyers

When we consider influence of advertisements, 65% percent of the rural population is not influenced by advertisements for purchasing mobile phones. According to the survey, the rate of brand recall of the mobile advertisement is only 19%, which indicates that brand ambassadors and heavy advertising does not influence the rural segment. The driving factor for the rural segment is the long battery life of the phone, as in rural areas electricity is a major concern. The other important factor is cost, since the average monthly income per household is Rs.5000; the mobile expense has to be affordable.

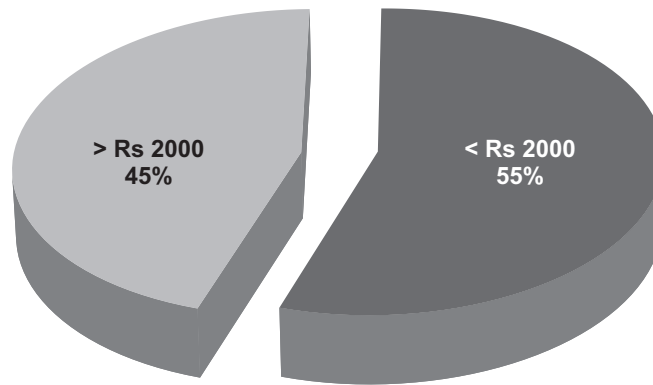


Figure 3: Price Sensitivity Of Buyers In Rural Markets

Thus, the data defines that the 55% of the target audience opts for a mobile which falls into a bracket of Rs 2000 or less. 67% of the target audience is motivated to buy a new mobile phone only when the phone stops functioning, unlike the urban market where there is a large replacement market. The most common problem faced by the users is the battery and the charger, which is not easily repairable in the rural sector due to limited service centers. Moreover 78% of the people showed willingness in repairing their mobile phones and are ready to pay more for this service. Today, in the mobile market there is a wide range of brands available with innovative features and latest technology making the competition tough. 62% of the respondents in the survey belonged to the age group of 20-30 years. They showed a keen interest in the features and functions such as FM, Camera, Hindi Language Translator, and Long Battery Life, provided they are available at an affordable price. Concluding, the survey revealed that there is tremendous scope of growth the rural market. The industry experts are predicting the shift from urban sector to rural sector and it is estimated that by 2013 the rate of growth in rural will touch 36% from the current 13%. Looking at the growth prospects there are reports showing that Indian telecom sector is one of the fastest growing industries.

Another survey carried out by MediaTek in Tier 2 cities like Bhopal and Lucknow with shopkeepers and mobile phone users to gauge the latest trends in this space. The survey was carried out over a sample size of 1000 people in Metros and about 300 shopkeepers. It consisted of a mixed group of people belonging to the middle and low income groups including young people and students. [4] [5]

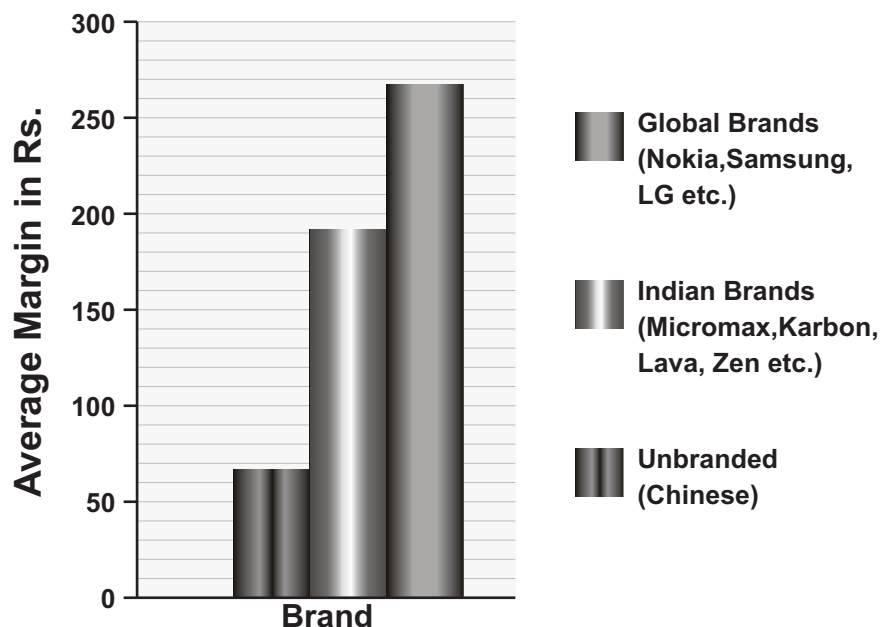
The study reveals that India is still a low cost phone destination. About 50% of the users interviewed still tend to buy a handset in the Rs.1500-Rs. 2000 range with basic functionalities. Findings are similar to rural survey where 55% of the rural users too buy a low cost phone based on the recommendations of peers, friends, family etc. However, some of the usage habits of users living in metro cities are changing, and this is in sharp contrast to people living in villages and other rural areas. While a rural person would prefer having a phone with a longer battery life, thanks to longer power cuts, one living in an urban setup or in a metro city would want a better looking phone which is high on features. Study says that the margin with global brands is the lowest and it also remains the most demanded with the metro consumers. With

the Indian brands it's a 50-50 split between higher margins and higher demand with consumers. Non-branded phones, although are the most profitable to sell for shopkeepers, aren't really popular with metro consumers since there are no after sales services and durability is an issue too. Many of the users surveyed bought their handsets based on the recommendation of a friend or someone known to them or based on self knowledge and research. Also about 21% of them would go with a handset which has a higher warranty period. If users are satisfied with their handset and the services provided they would wholeheartedly recommend it to the people known. 70% of them would even buy the same brand again, if satisfied. Usage patterns of a metro user are very different from that of a person living in a village. They are less likely to compromise on looks or functionality for price. The study also reveals that a large number of urban users prefer a global brand over an Indian or a locally manufactured brand. Also 42% of them would prefer to buy a brand new handset rather than going with a used second hand model. In metros the features like multimedia, dual SIM, long battery life, big screen and loud sound are popular among people in age bracket 15-35 years, these features are available in Indian and homegrown brands in about Rs 2500-3000. [4] [5]

Retailer preferences for Mobile handset brand:

Survey covered retailers in the B and C class areas of the tier 2 cities. Of the three types of brands retailers get highest margin on Chinese gray market handsets. All of them unanimously say that consumer knows that the handset has no guarantee, and go for the best available set of features in the lowest price range. Due to innovation at chip level almost all the features are available in a Chinese mobile phone priced at Rs 2000. These handsets sell the most among all other brands, in these areas. G-five is the top most selling brand in this category.

Indian brands also give enough motivation to the retailers in terms of high profit margin. These branded sets have the service warranty of an year at least. So it is an added advantage for the retailer that they don't have to push the consumer to buy the Indian brands. It sells by the brand name itself, which brands like Micromax, Lava, Spice have built through advertisements, specially getting in the celebrities to endorse the brand.



Figures are from the research done for Lucknow market in middle and lower middle class areas

Figure 4: Average Margin offered by Indian & Global Brands

Market war has turned fierce amongst the Indian brands also, as we see that several new brands like, Videocon, Sky mobile, Colors, Mobil etc have entered the market. The newer brands, to set their foot in the market give Credit period up to 15 days, and even “pay when you sell” facility in some cases is given to the shopkeepers.

Amongst the global brand Nokia gives the lowest profit margin. Other global brands like LG, Samsung, Sony Ericsson give comparatively higher margin than Nokia, but not as high as the Indian and Chinese brands. The prime reason for retailers to keep the brand, are that they are easy to sell through brand value and consumer demands it. Besides this there are some incentives that shopkeepers get on certain specified amount of sale. These incentive offers come from time to time around the year and are also available in Indian brands.

Mobile application for the Masses:

C++ and Java environment is available in low cost multimedia handsets now. This has provided users with attractive and simple to understand Graphical User Interface (GUI) and it has increased the application compatibility of these handsets. With the number of such handsets growing, it will generate a clear market for applications, as it happened in case of Apple I-Phone. We can see in the near future, the low cost & innovative design houses coming up with their own app stores selling C++ and Java based utility applications. The nature of application demanded by such a user group would obviously be different than applications for I-phone. The design houses and application vendors will have to find innovative channels for selling apps, as the revenue model is not yet clear.

Majorly the application which one could foresee to be of use to this consumer segment would be like Voice based Hindi and other local language commands to operate phone [7], reason being considerable amount of the user in this segment are illiterate. Companies like “Nuance” are doing have done cutting edge research on this. More over applications helping in the travel planning, ticket booking, route finding will be the ones required by the masses.

With M Commerce likely to enter Indian market of late there is a clear possibility that application for transaction of money and m-Banking would be required as in rural areas banking facility is not good. It will also catch up in towns as it would be a lot easier to transfer money through mobile than standing in a long queue. Bill payment application will be widely used for paying bills for electricity, water etc. [6]

It is notable that the relationship between handset vendors and VAS is undergoing a sea change. The change has been apparent now from keypads to the enlarged screen. Qwerty keypads which are now visible in most of the emerging handsets is demonstrating as to how vendors are eying to capture the imagination of the consumers by facilitating them with keypads to screens that will help them in surfing net and use social networking sites. So we will see the forthcoming handset being designed around what type of VAS is used by the consumers. [8]

Conclusion:

Low spending power of the lower middle class youth (15-35 years) and the bottom of the pyramid consumers who reside in rural and tier 2 and tier 3 cities (don't care much for brands), has created a phenomenal demand for low cost mobile handsets which suits their growing need for access to the

entertainment through the small screen which acts as a stereo, a radio, a video player, a video camera, a TV and of course the tendency to use multiple prepaid SIM cards. The volume demanded in such market is huge, the reason being a large population and growing tele-density. Recently established homegrown companies are growing aggressively, and are catering well to this segment through innovation resulting in reduced cost of production. We may see in the near future a rise in demand for cheaper broadband services in the market segment mentioned above, especially after the deployment of WiMAX. Such home grown companies may be the first ones to provide them with low cost access devices. VAS services used by the consumers will also be the key influence in the evolution in the technology used in these handsets.

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Self Care: Unleashing the Power of Superior Customer Service

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Abstract:

In an environment of constant cost pressures, decreasing tariffs, differing cultural realities and increasing customer expectations, Telecom Service Providers are forced to leverage self service as a way to meet customer needs at a fraction of cost of traditional service channels such as call center and retail presence. Combined with increase in customer connectivity and desire to self serve, a robust self service capability is rapidly becoming a critical strategic capability.

It is of paramount importance for a Telecom Service Provider to evaluate its adoption, penetration capabilities of its existing Self Care Channels and make the subscribers' Self Care experience comprehensive, efficient, relevant and seamless.

Self Care is a personalized service which allows users to execute complex activities which normally would take more time. Thus, self care is a simple process which helps the customers and which in turn helps the provider.

Out of millions of QRC (Query Requests Complaints) that are handled each day a large chunk are handled by call centre and Operator store. These systems, though scalable, are not cost effective. The subscribers' increased desire to Self Serve and the demand of instant gratification, Self care channels are poised to be key player in delivering customer delight.

This paper throws a light on the various self care channels like USSD (Unstructured Supplementary Services Data), IVR, Web-Self Care, Kiosks, WAP, and SMS Automation. This paper is an outcome of research done for a leading telecom operator in India.

Overview:

Over the years, telecom has emerged as one of the leading industries in the services sector. Hence, it has become extremely vital for the various players in the telecom industry to provide high value on the services provided. One of the most important factors in this respect is the Customer Relationship Management through post-sales services and offerings. Service providers have adopted various techniques through which they reach out to their customers. But owing to the rapid growth in customer base, there is a need to look at more cost-efficient ways of CRM in telecom.

And so the key business drivers:

- Increasing Customer satisfaction
 - Minimizing the cost to company by decreasing the dominance of costly channels
 - Minimizing in customer churn which may increase post MNP implementation.
-
- The Customer Care facility is the oft-used CRM technique wherein every individual customer is catered to by a customer care executive personally. This is an effective method in terms of building strong relations with customers, as it provides one-to-one contact with the company. But one of the biggest drawbacks of this method is the cost incurred per call for the service provider, which could go as high as Rs. 5-6.
 - Interactive Voice Response is being used by service providers as an alternative to the customer care facility, which replaces the executives with automated voice responses to various queries. This reduces the per-transaction cost to around Rs. 3-4, but has the drawback of not providing one-to-one contact with the customers.
 - Unstructured Supplementary Services Data (USSD) is a cost-effective technique used by many service providers today, which is also found to be more convenient by the customers than IVR. The only limitation to this technique is that it is generally available on postpaid connections only.
 - SMS Automation, SMS Service Portal and Web CRM are other CRM techniques used by service providers, but the general observation of these services is their failure to generate awareness amongst the large customer base, and its various infrastructure constraints.

1.1 Existing Channels of Self Care:

- The existing self care channels are:
- USSD (Unstructured Supplementary Services Data)
- IVR (Interactive Voice Response)
- EBP (ELECTRONIC BILL PRESENTMENT)
- Web CRM
- SSK (SELF SERVICE KIOSKS)
- SMS Automation
- WAP (Wireless Access Protocol)

1.1.1 USSD (Unstructured Supplementary Services Data)

Unstructured Supplementary Services Data (USSD) service allows high speed interactive communication between mobile subscribers and applications across all GSM handsets without the installation of additional software. USSD is a device independent session based service. This is unlike SMS which uses the Store and Forward mechanism. USSD provides menu based browsing experience. It provides quicker response time which is 7 times faster than SMS. Low cost access and simplicity makes USSD a very important channel of self care.

Advantages for Mobile operators:

- Leverages current network capabilities; eliminates investment in additional systems.
- Cost efficient technology, ideal for self-care and interactive services.
- Reduces load on call centers and IVR systems.
- Enhanced speed to market. Revenue generating applications can be quickly brought to subscribers through the reduced complexity of network design and single access portal for multiple services.
- Improved subscriber stickiness that allows an operator to offer a wider variety of personalized services.

Advantages for end users:

- Easy access to value added services (VAS) using a familiar dialing sequence.
- Menu based direct access, interactive dialogue.
- Location independent; services accessible even when roaming.

Prerequisites for using USSD:

- Network Availability
- English literacy amongst the users

1.1.2 IVR (Interactive Voice Response)

Interactive voice response, or IVR, is a technology that allows a subscriber to listen to pre-recorded messages and interact through keypad inputs. The term interactive voice response (IVR) system is used to describe a range of automated systems generally accessed through a telephone interface. Thus, IVR is

a technology that automates interactions with telephone callers. Enterprises are increasingly turning to IVR to reduce the cost of common sales, service, collections, inquiry and support calls to and from their company.

Advantages:

- Operating costs per minute is lower in comparison to cost associated with call agents as IVR is a fixed component & one-time investment.
- Provides 24x7x365 access to information and provides ready access to callers without web access.
- Often more efficient than talking to an agent, especially for repeat callers.
- Offers uniform service quality across circles and handles repetitive tasks with consistent efficiency.

Tradeoffs:

- Not as personal as a live agent
- Often seen as a barrier by callers
- Cannot automate all services required by callers

Prerequisites for using IVR:

- Network Availability

1.1.3 EBP (Electronic Bill Presentment)

EBP is a real-time, web-centric, customer-friendly, enterprise-wide billing and CRM application. The web-based application provides customers with an easy-to-understand and user-friendly bill presentation layout.

Operation Process:

- Capability to design bills.
- Capability to extract and pass the extracted files.
- Capability to redefine the business rules.

Prerequisites for using EBP:

- Internet availability.
- Subscriber Login-ID.

1.1.4 Web CRM

Web CRM allows the subscriber to manage the account online. This includes making online payments, changing talk plans, activation of services etc.

Details Regarding Web CRM

- Web CRM is a widely used feature amongst high end users.
- Web CRM is the channel through which the user can get information of most of the features

Prerequisites for using Web CRM:

- Internet Connectivity
- Valid Registration Id
- English literacy amongst the users

1.1.5 SELF SERVICE KIOSKS

The Self Service kiosk enables customers to view and pay their bills and buy recharges. They can also activate GPRS, STD and other services through the kiosk.

Advantages:

- Improve productivity - cuts out the time spent by store staff handling commodity purchases, which take an average of 8-10 minutes, freeing up resources to help other customers
- Increase profit margins - significantly reduces the cost of sale especially amongst core pre-pay customers
- Open new revenue streams - could enable expansion into new sales venues, markets and services
- Reduce operating costs - secondary distribution channels can be used to achieve a local presence quickly and avoid the cost of new store openings
- Improve customer experience - people now have a choice of how to purchase, so everyone benefits from faster and more efficient service
- Strengthen brand image - will significantly increase the service provider's visibility

Prerequisites for using SSK:

- SSK connectivity
- SSK operability

1.1.6 SMS Automation:

SMS automation involves Activation and De-Activation of services like ISD, STD, and CRBT by sending the proper code to XXX through SMS directly. SMS Automation application helps the subscribers to activate or deactivate for some services with the help of SMS right from their cell phone. The service activation/deactivation request received through SMS from the subscriber is processed in CRM.

Details regarding SMS automation:

- SMS is most preferred channel of self care in comparison with other channels.
- The methodology used is store and forward where subscriber just sends the message and waits for response.

Prerequisites for using SMS automation

- Network Connectivity
- English literacy amongst the users

1.1.7 WAP: (Wireless Access Protocol)

This application is used to facilitate post paid customer with services like My services, My talk plan, My Billing Info, My Feedback, Pay bill on WAP.

Details regarding WAP:

- This Channel is least used channel for self care.
- The biggest hindrance in using this channel is that the user should have GPRS enabled handset.
Prerequisites for using WAP
- User should have GPRS access.
- User number must be registered on CSS on web

1.1.8 Industry Analysis:

The table below shows analysis of the various channels provided by various operators:

Telco \ Features	Vodafone	Airtel	Idea	RCom	TTSL	Aircel
USSD	✓	✓	✓	✓	✓	✓
IVR	✓	✓	✓	✓	✓	✓
SMS AUTOMATION	✓	✓	✓	✓	✓	✓
SSK	✓	✗	✗	✗	✗	✓
WAP	✓	✓	✓	✓	✓	✓
EBPP	✓	✓	✓	✓	✓	✓
Web CSS	✓	✓	✓	✓	✓	✓
E-shop	✓	✗	✗	✗	✓	✗
M-shop	✓	✗	✗	✗	✗	✗
Twitter	✓	✗	✗	✗	✓	✓
DSTK	✗	✗	✗	✗	✓	✗
Online Chat with Agents	✗	✗	✓	✗	✗	✗
Orkut & Facebook	✗	✗	✗	✗	✓	✓
Call Back	✓	✗	✗	✗	✓	✗

Table 1 Industry Analysis (Channel Wise)

The table below shows analysis of the various features provided by various operators:

Telco \ Features	Vodafone	Airtel	Idea	RCom	TTSL	Aircel
Bill Summary	U,I,S,SSK,W,E,WC	U,I,WC,W,S	U,I,WC,S	U,I,E,WC,S	U,S,WC,E,I	U,I,WC
Talk Plan Details	U,I,S,SSK,W,E,WC	U,I,WC,W	U,I,WC	WC	WC	I,WC
Payment	I,W,WC,MS	I,WC	WC	WC	W,ES,WC	WC,I
Balance Details	U,I,WC	U,I,WC	U,I,WC	U,I,S,WC	U,I,S,WC	U,I
Last 3 Call Details	U,I,WC	X	X	X	X	X
Last 3 Recharges	U,I,WC	X	X	X	X	X
Recharge	I,W,W,C,MS	WC	WC	WC	WC	U,I,WC
Pre to Post Paid Migration	I	X	X	X	X	X
VAS	U,I,S,SSK,WC	U,I,WC	U,I,WC		I,S,WC	WC,I,S
Roaming & ISD	U,I,S,SSK,WC	WC	I,WC	WC	WC	S,I
Services	U,I,S,SSK,W,E,WC	U,I	U,I,WC	I,WC	I,S,WC	WC
New Offers	U,WC	U,I,WC	U,I,WC	WC	U,WC	I
New Connection	I,ES	X	X	WC	I,WC	WC
PUK SIM Loss	I	X	X	X	I	I
World Calling Card	I,MS	WC	X	WC	WC	X
Merchandize	ES	X	X	X	X	X
Payment of Utility Bills and Insurance Premium	MS	X	X	X	X	X
Booking Airline & Movie Tickets	MS	X	X	X	X	X
Buying Gifts, Flowers and Dish Tv recharge Vouchers	MS	WC	X	WC	X	X
Compare Plan	WC	X	X	X	WC	WC
Change Plan	SSK,WC	WC	WC	X	WC	WC
Service Request Status	X	U	X	X	X	X
DND	S	S,U	WC	X	WC,S	S,I
Bill Clarification	X	I	X	X	WC	X
Mobile not working	X	I	X	X	WC	X
Best Offer	X	I	S	X	WC	WC
USSD=U SSK=SSK	IVR=I Web CSS=WC	SMS AUTOMATION=S M-SHOP=MS		EBPP=E E-SHOP=ES	WAP=W	

Table 2: Industry Analysis (Feature Wise)

Key findings of the analysis:

- With reference to the number of channels used for Self Care, among all the operators Vodafone has largest number of channels.
- DSTK is a new channel of Self care which can be cost effective as well can be used for basic transactions. [DSTK (Dynamic SIM tool Kit): Embedding of the self care applications on SIM which can be directly used through push SMS mechanism]
- Social Networking Sites having high foot-falls should be looked at as effective self care tool.
- But the penetration of all these channels being low, there might be case of having too many channels.
- Possibly the channels like EBPP can be integrated with Web CRM but will reduce the operational costs whenever there is change in architecture of the various systems.

1.1.9 IVR Analysis:

The Figure shows zone wise IVR usage for one of the leading service providers in India from June'09 to March'10:

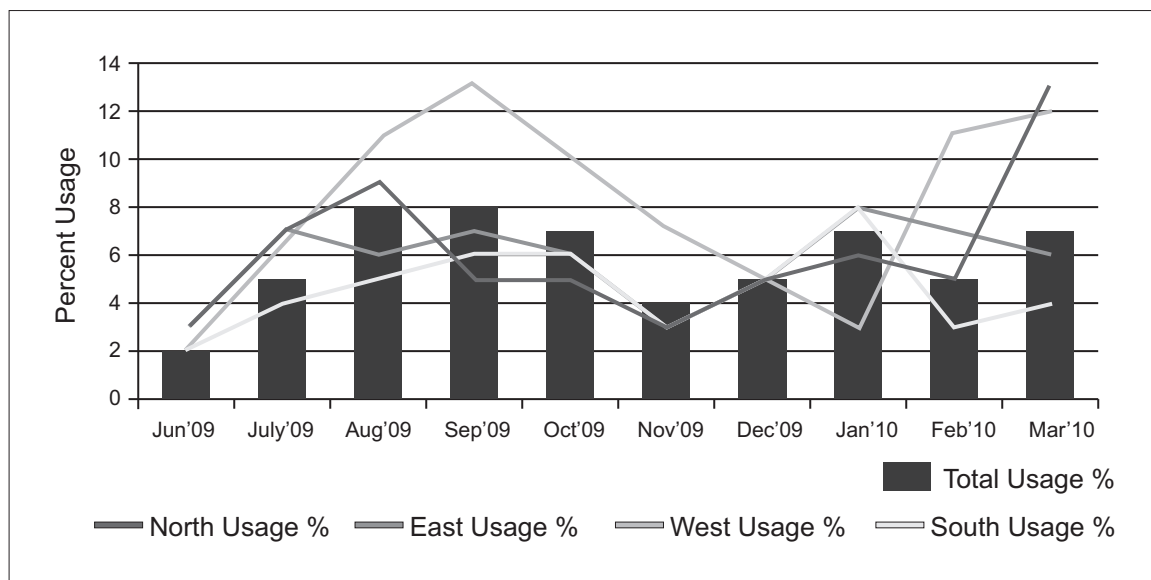


Figure 1: IVR Usage Zone wise Analysis

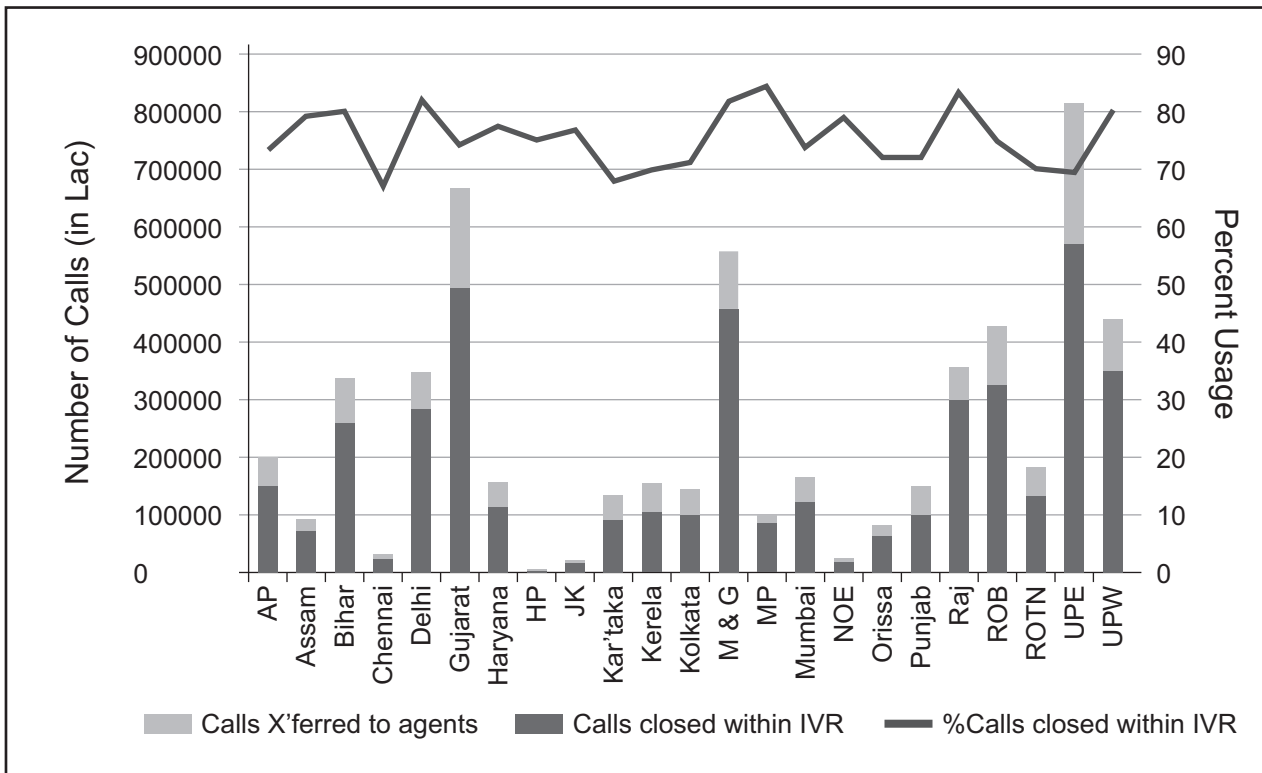


Figure 2 : Circle wise analysis of transaction carried out for a leading service provider in IVR

**Key Finding of the Analysis of IVR usage:
For a particular operator:**

- IVR service is most used in UP east circle (over 8 lac calls/day).
- The other circles having high IVR usage is Gujarat and Maharashtra & Goa.
- The other circles showing healthy usage are UP west, Rest of Bengal, Delhi and Rajasthan.
- The percentage of calls transferred to customer care is least in Madhya Pradesh circle (Approximately 16 %).
- The percentage of calls transferred to customer care is highest in Chennai and Karnataka circle (Approximately 32%).
- The widely used options under IVR menu are VAS and billing related information.
- The least used option under IVR is for information related to roaming and ISD.

IVR Language Option Analysis:

The figure shows IVR language analysis showing which language is preferred in which circle:

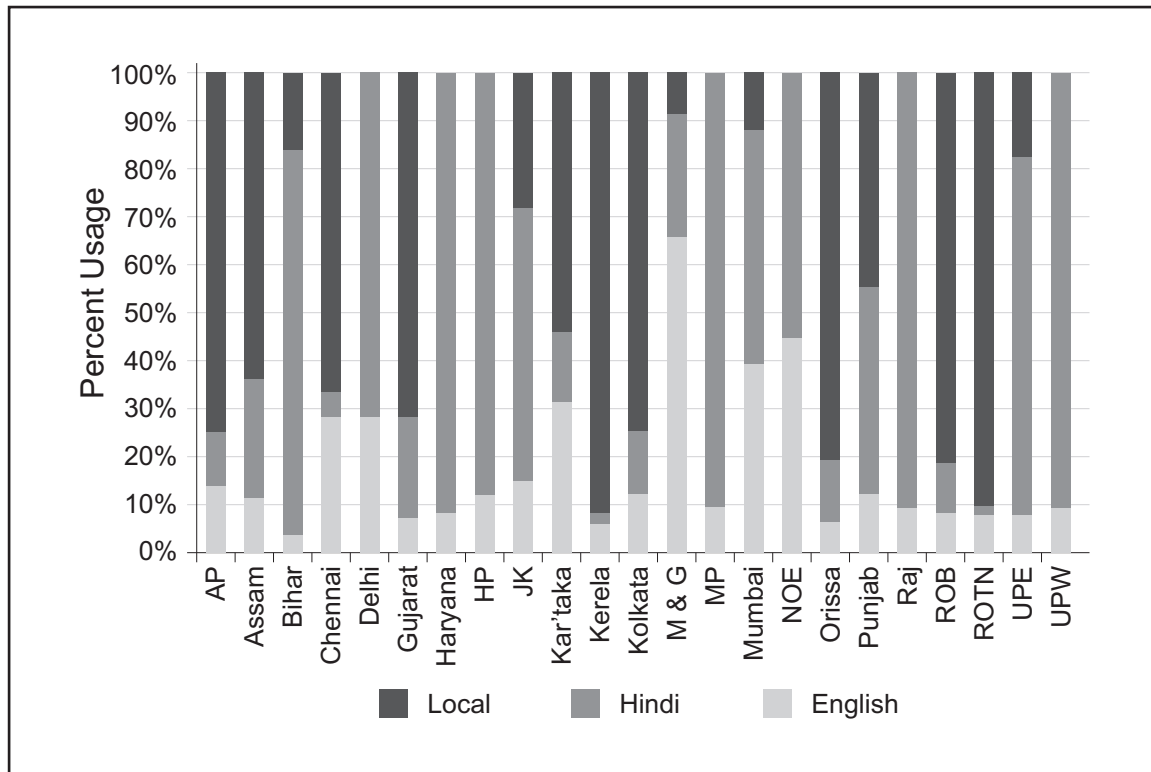


Figure 3: IVR Language Analysis

Key Finding of the Analysis

- Maharashtra & Goa is the only circle where English is the most preferred language.
- Southern circles like Tamil Nadu, Karnataka and Andhra Pradesh prefer the local language for their IVR interaction.

From the above analysis, it can be clearly seen that for IVR to succeed as an effective self care channel, the language has to be altered according to the preference of the audience.

1.1.10 Web CRM Analysis

The figure shows zone wise Web CRM usage for a leading service provider from June'09 to March'10:

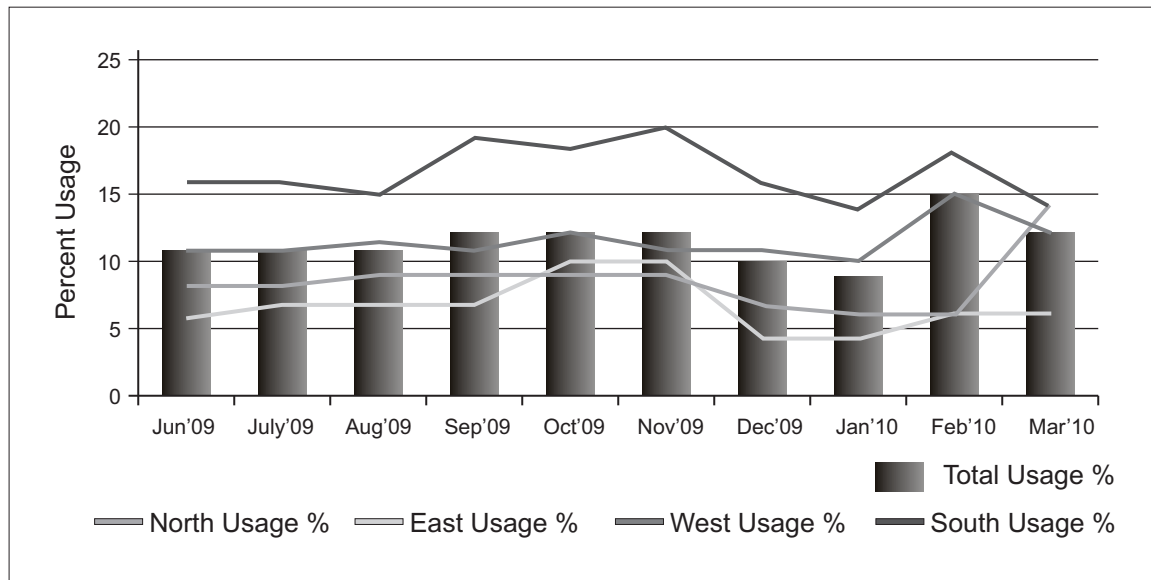


Figure 4: Web CRM penetration zone wise

The figure shows circle Web CRM penetration in comparison to Post Paid subscriber base:

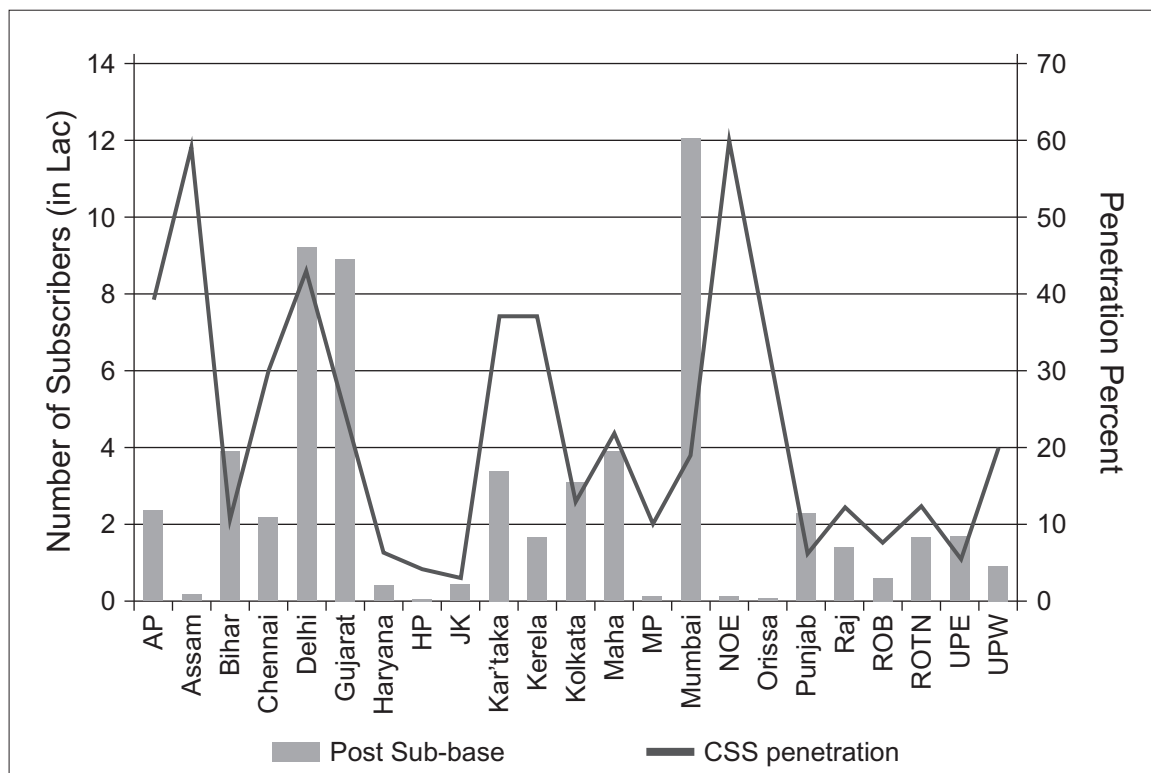


Figure 5: Web CRM (CSS) Penetration vs Post-paid Subscribers

Key Finding of the Analysis:

- The Web CRM penetration is the maximum in South Zone.
- The Web CRM penetration is the least in East Zone.
- The maximum unique user logins are from West Zone.
- Of all the channels of self care, requests solved through Web CRM channel are considerably low.
- The West Zone the highest potential to increase its CSS usage with high internet penetration.

As expected, the southern zone, having the maximum internet penetration and English literacy, also has the highest Web CRM penetration, whereas the eastern zone, with limited internet penetration and English literacy, has the lowest Web CRM penetration.

Conclusion:

- USSD usage needs to be increased to a greater extent in comparison to other channels; the main reason being that of all the channels, USSD is the most cost effective, costing just 20 paisa per transaction.
- The number of features is pretty less in USSD and should be increased so as to increase the usage.
- For channels such as USSD, English literacy is the problem, affecting the overall penetration level. Multilingual options should be made available to increase the penetration.
- Web CRM penetration is low as it is only available to English literate people hence it should be made available on local languages.
- Penetration of channels like USSD and IVR being low in Metros, there is a need to create awareness amongst the subscribers regarding these channels.
- The percentage of calls transferred to call agents through IVR is mostly on the high side. The possible reasons for the same should be resolved so to increase the usage of IVR.
- SSK can be promoted as 24*7 services for self care and hence can result in increased usage of Self Care Channels.

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5. www.trai.gov.in

Monetizing the convergence of Social Networking, Mobile Phones & Location Based Services

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Abstract:

The paper analyzes the immense popularity of social media across the globe. It is interesting to note that three of the world's most popular online brands are social-media related and for the first time ever, social networking or blog sites are being visited by three quarters of global consumers who go online. The online community has truly taken up “Socializing” in a big way.

Socializing reached its' second-generation, when it got introduced over the mobile platform. The same has provided the much needed fillip to the VAS Managers of the telecom industry so as to garner additional revenue. It has helped the social users across the globe in “Mobilizing” by means of their mobiles devices against their hitherto available stationary computer devices. Other communities are also converging into this mobile social media be it the game developers, the advertisers or any service provider. For organizations' it is another channel to listen to the voice of their customers and a medium for direct promotion & customer engagement.

A new dimension is arising within the mobile social media space thanks to the reincarnation of Location based services (LBS). Social mobile subscribers would benefit from this “Localizing” given their ability to share the location coordinates while on the move.

The paper throws light on the opportunities and the revenue model for social media owners and telecom operators. Contextual and location-targeted advertising, combined with premium services and virtual goods may provide a means of effectively “Monetizing” this medium. It would be interesting to see if the hype around location based social networking over mobile devices would become passé or it would emerge as the next big revenue earner for telcos.

Social Networking The fastest growing Socializing platform:

What started in the woods around a camp fire in the Pre-historic era; transitioned into the yesterdays' adda and today it has matured into something we know as social networking. Socializing is an inherent human characteristic and has been instrumental in shaping and defining our thoughts, feelings, and actions; as it also provides us with a model for our behavior. But what's interesting to note is the fact that this new platform of socializing, called social networking service (SNS), has gained immense popularity in perhaps the shortest span of time.

According to Wikipedia a social network service essentially consists of a representation of each user (often a profile), his/her social links, and a variety of additional services. Most social network services are web based and provide means for users to interact over the internet, such as e-mail and instant messaging

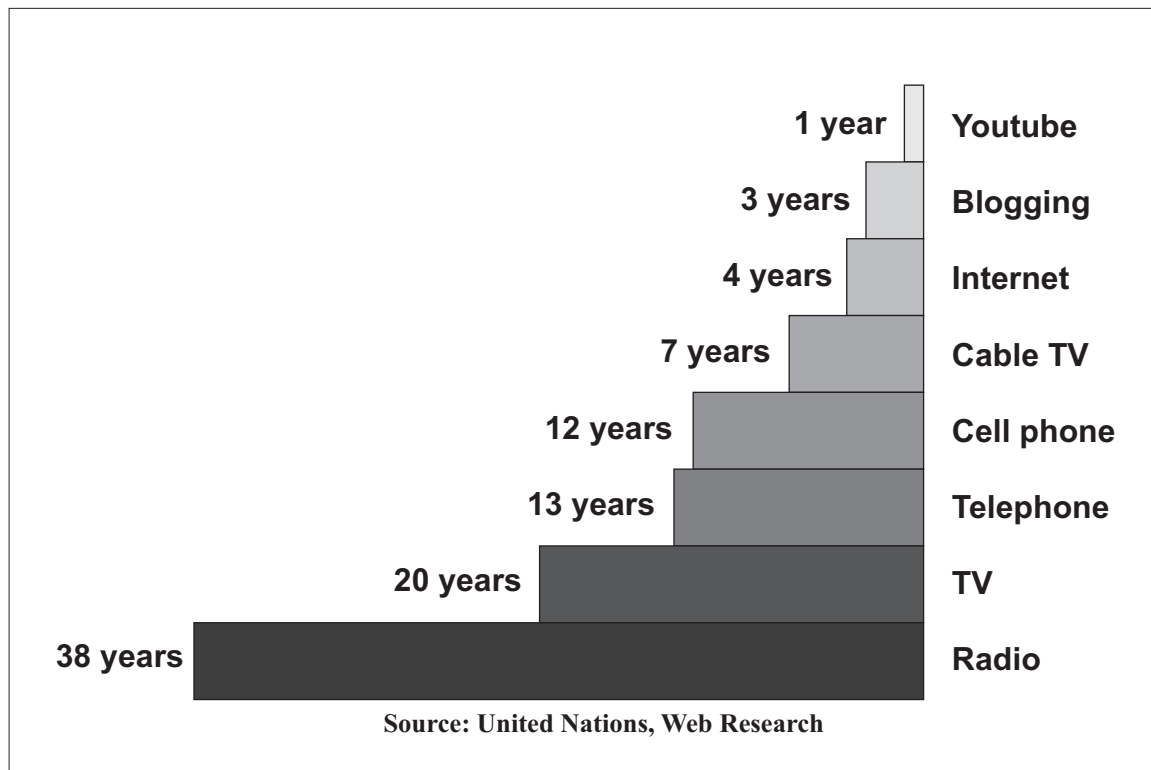


Figure 1: Number of years a new form of technology has taken to reach 50 million people

One of the leading social networking sites: Facebook added 100 million users in less than 9 months. If Facebook were a country it would be the third largest, only behind China and India. It is also the third most popular online brand (as per Nielsen Report, April 2010). Some of the other sites that are adding to the popularity of social networking platform includes: Twitter, MySpace, Hi5, LinkedIn., Orkut, Tagged, Bebo, XING and Friendster.

Social Networking sites are immensely popular on account of their basic and value added features:

A. Basic Features: These are some of the features that is most commonly available across all social networking sites:

- **Profile:** Individual users are encouraged to create profiles containing various information about themselves (persona, professional & interests)
- **Photos/Videos:** Individuals often post photos or videos; which sends trigger alerts to their networked friends/users
- **Blogging:** Individuals can post blogs which are broadcasted to all networked friends/users in the form of alert or notifications.

- **Email:** Most of the social networking sites also provide a means of sending private messages/emails.
- **Contacts:** Similar to an address book, social networking site provides an online contact list of all friends/users falling in the network. One benefit of this feature is that any updates to the contact details are updated automatically thus avoiding the need for manual updates to one's address book.

B Value Added Features: These features can be numerous and often characteristic representation of the niche that a social networking site has created for themselves:



Figure 2: Value Added Features

- **Chat/IM:** This feature is getting immensely popular for home as well as office users; who see SNS as a common platform to chat with friends as well as collaborate with office colleagues.
- **Gaming:** It has attracted users across all age-groups to entertain themselves with online asynchronous games. Also, a means to demonstrate or show-case one's achievement in a game to their friends.
- **Ads/Shopping:** Service providers are immensely benefiting from this social platform by offering or promoting their own products or services.
- **Groups:** Some social networking sites provide the ability to create groups (private or public) to induct users with similar interests, purpose or affiliation.

- **Discussion Forum/Survey:** Discussion boards and surveys are being provided by SNS as a means to discuss debate and seek opinion from others pertaining to some topic.
- **Interoperability:** One of the power features being provided by the social networking sites is the symbiotic ability to exchange information across other social networking or media sites.

Individuals subscribe to social networking sites for multifarious reasons, perhaps depending on the type of network and their motivation. Social networking sites in a sense touch upon the three fundamental elements of Maslow's hierarchy of Needs i.e. Safety, Love/Belonging and Esteem:

- **Safety:** Some people use SNS to find jobs. Sites such as **LinkedIn** allow people to make professional connections; facilitating job hunting and allowing a user to showcase his/her resume and information to more people than one would ever meet in a traditional local networking event.
- **Love/Belonging:** Some people use SNS to connect with real world friends, family members or relatives. On **Facebook**, for example, one can upload pictures or post messages. By doing so they can broadcast and communicate any event, object (pictures / videos), message, etc which can be viewed by others in the network as per their own convenience.
- **Esteem:** SNS users typically showcase achievements by uploading photographs or posting messages. Online gaming applications are another source of demonstrating one's skills and inciting others to follow suite. A game like **Farmville** is one example to quote in this regard. Also, **Twitter** has emerged as a intelligent tool for celebrities to connect directly with their followers or fans; the followers or fans in return feel the joy of this esteemed affiliation to their stars or celebrity icons.

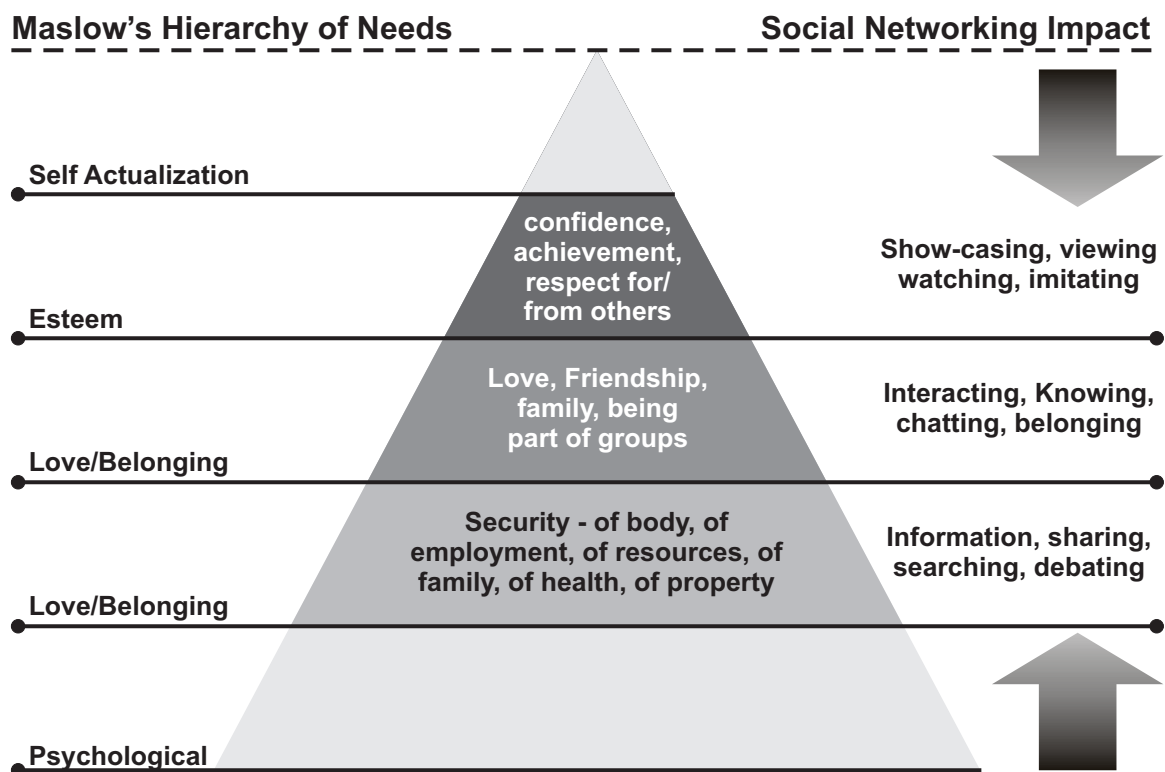


Figure 3: Maslow's Hierarchy of Needs

SNS transcends geographical boundaries and is a global phenomenon; but what's more interesting is that fact that it is gender or age neutral. Research conducted for US users across the vastly popular networking sites reveal that 25% of the active users fall within the age group of 35-44 years (Source: Pingdom). Also, female users are more active on

SNS than men. This fact has also been substantiated across the globe (In Asia Pacific alone, SNS percentage reach stands at 54.9% for females and 50.7% for males):

Worldwide Social Networking Category Usage and Engagement by Females and Males May 2010 (Total Worldwide Audience, Age 15+ - Home & Work Location) Source: comScore Media Metrix					
	% Reach	% Unique Visitors	% Pages	% Minutes Spent	Avg. Hours per Visitor
Total Audience	72.5%	100%	100%	100%	4.7
All Females	75.8%	47.9%	57.0%	56.6%	5.5
All Males	69.7%	52.1%	43.0%	43.4%	3.9

Table 1: Worldwide Social Networking Genderwise Category Usage and Engagement:

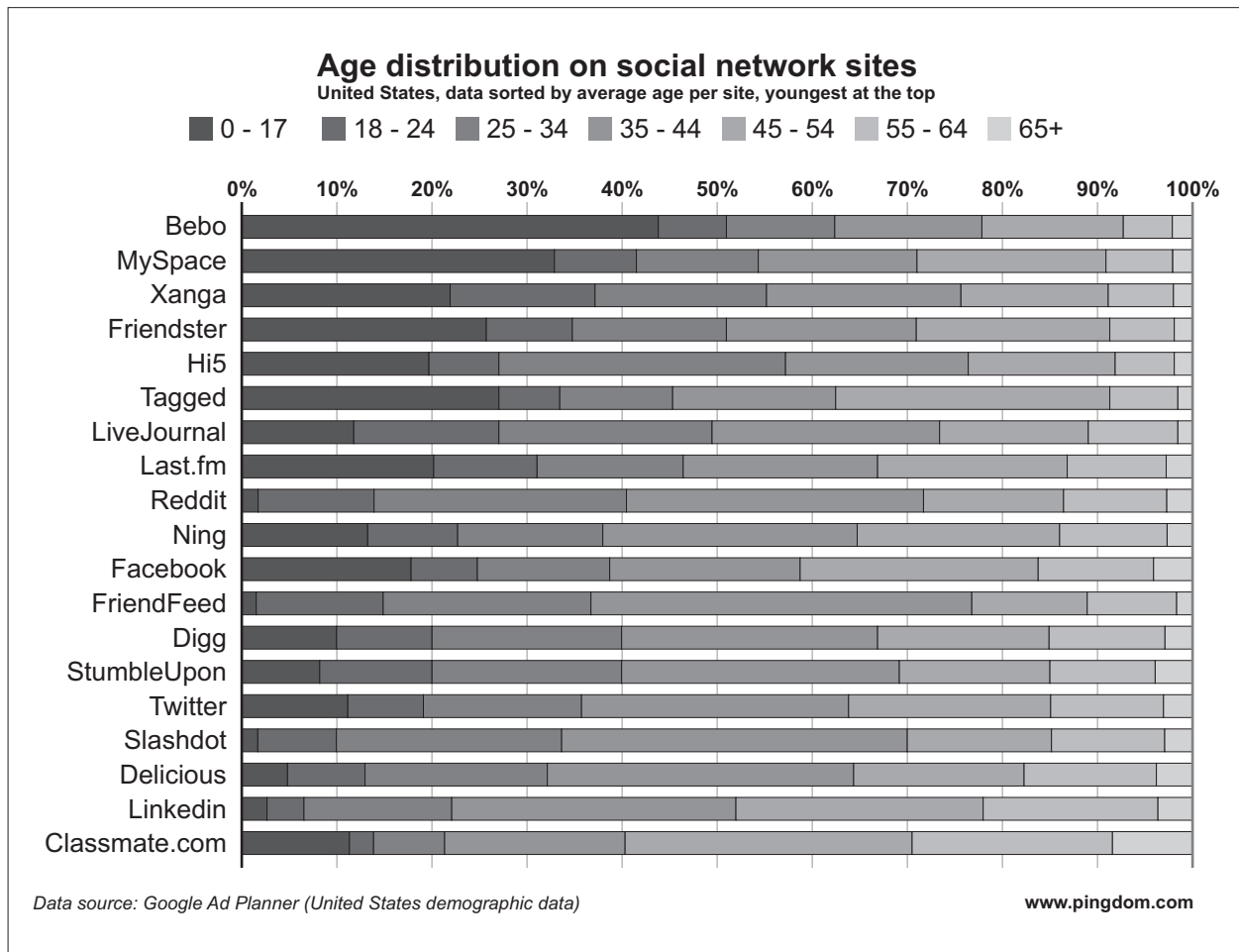


Table 2: Age Distribution on SNS in USA

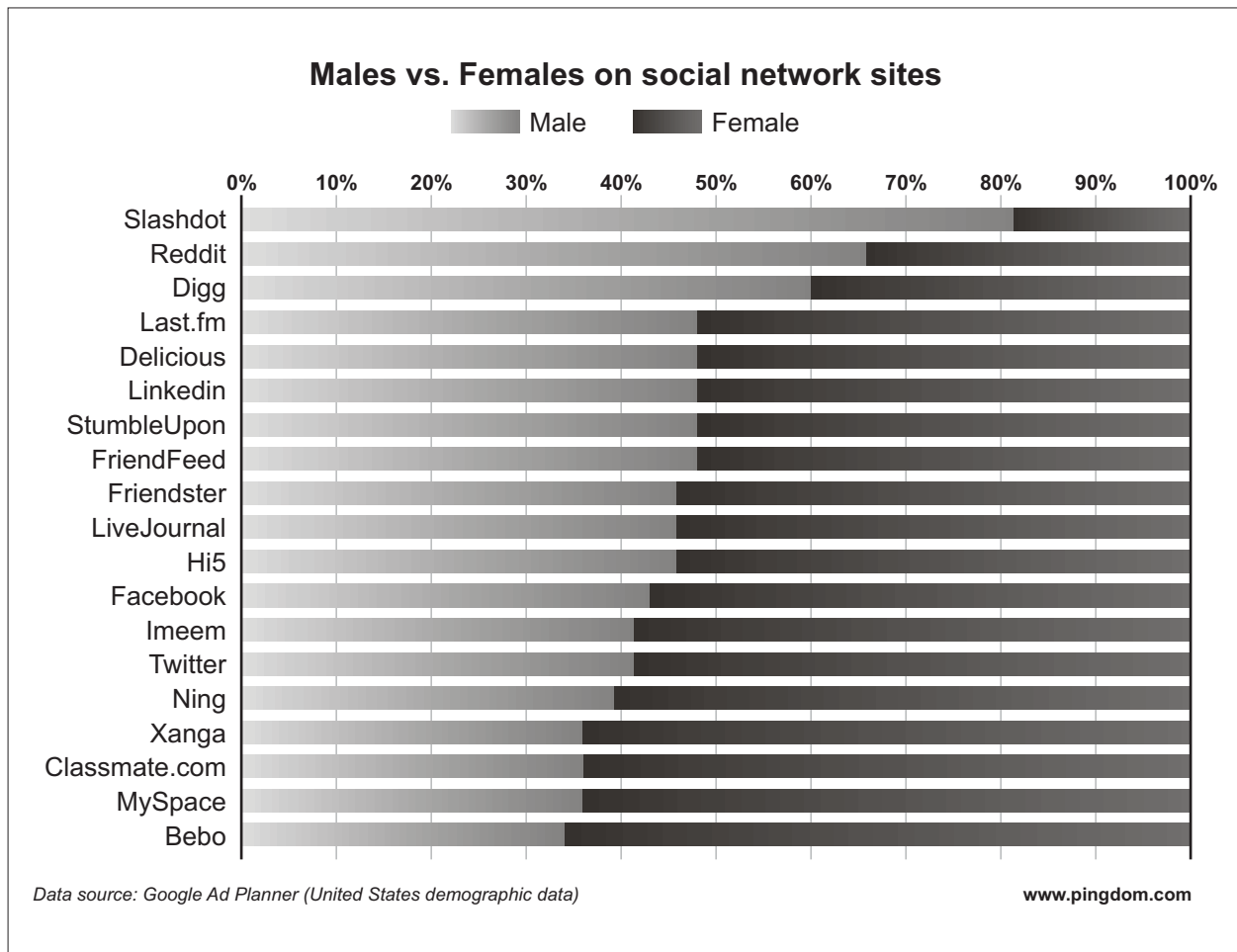


Table 3: Male Vs Female on SNS

Mobile based Social Networking Service A big leap to *mobilize* the social users

A trend that is sweeping all the popular social networking sites is the phenomenon to **“Go Mobile”**. The global mobile penetration rate is touching the 70 per cent (while 45 per cent of all mobile users come from Asia Pacific) mark; and has adopted a pace greater than that of the PC penetration. A mobile device does not mean only handsets but it also includes any small to medium size devices like iPads, gaming consoles (like PSP).

Mobile based SNS (By nature of promotion): Initially, there were two basic types of mobile social networks. The first is companies that partner with wireless phone carriers to distribute their communities via the default start pages on mobile phone browsers, an example is JuiceCaster. The second type is companies that do not have such carrier relationships (also known as "off deck") and rely on other methods to attract users.

Mobile based SNS (By type of evolution): : There are web based social networks that offered mobile access through mobile browsers and Smartphone Apps. While, there are also native mobile social networks with dedicated focus on leveraging the benefits of the mobile technologies. The web based social networks have an edge for having amassed a larger group of users; who could be easily enticed to use the mobile channel. The popularity of native mobile based social networking can be correlated from the growth of mobile users who are accessing SNS through mobile browser (90 per cent growth) or by

downloading mobile apps (240 per cent growth) in US:

Fastest-Growing Content Categories via Browser Access 3 Month Avg. Ending Apr. 2010 vs Month Avg. Ending Apr. 2009 (Total U.S. Age 13+) Source: comScore MobiLens			
	Total Audience (000)		
Browser Access Category	Apr-2009	Apr-2010	% Change
Total Audience: 13+ yrs old	232,000	234,000	1
Social Networking	15,708	29,835	90
Bank Accounts	7,801	13,154	69
General Reference	7,246	12,084	67
Sports Information	14,033	21,549	54
Search	23,266	34,912	50
Stock Trading	3,214	4,817	50
Classifieds	7,039	10,181	45

Table 4: Content categories via browser access

Fastest-Growing Content Categories via Application Access 3 Month Avg. Ending Apr. 2010 vs Month Avg. Ending Apr. 2009 (Total U.S. Age 13+) Source: comScore MobiLens			
	Total Audience (000)		
Application Access Category	Apr-2009	Apr-2010	% Change
Total Audience: 13+ yrs old	232,000	234,000	1
Social Networking	4,270	14,518	240
News	4,148	9,292	124
Sports Information	3,598	7,672	113
Bank Accounts	2,340	4,972	113
Weather	8,557	18,063	111
Movie Information	3,296	6,359	93
Maps	8,708	16,773	93

Table 5: Content categories via application access

Location based Social Networking Service Introducing the third dimension of *Localization*

A third wave of innovation has struck the SNS space with the introduction of location based services. Location based social networking (LBSN) allows the user to share to track and share location-related information with each other, via any mobile device (handset, laptops, iPads, etc). As location is one of the most important aspects for people's everyday lives, a lot of novel application scenarios can be supported by LBSN.

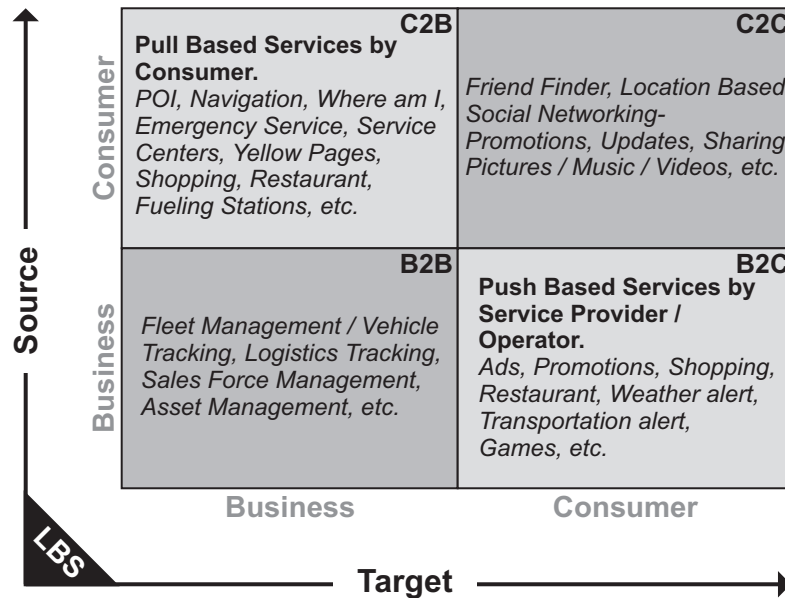


Figure 4: Classification of LBS based on SNS

For example, one can collect and share more trustworthy location recommendations through LBSN and use them to rank interesting locations and to discover new places, people, and activities. One can also track and share one's travel trajectory with friends in real time who can find out your whereabouts from their mobile phones. Blogs, status, photos or videos can also be shared together with one's location information. While, the most commercial & contemporary use of LBSN sites is perhaps the phenomenon of recommendation. Someone new in town can receive recommendations about a good restaurant, so as to go and explore it. A popular LBSN with this feature is Foursquare. **Foursquare** lets the user add a “tip” to a location. A tip is like a review or a recommendation. One can leave behind words of wisdoms for other visitors and locals to help them with life-changing information like “Order the lasagne at The Big Chill restaurant in East of Kailash, New Delhi” or “Check out the food festival going on in BBQ Nation in Kalyani Nagar in Pune”. The flip side of these tips is that when a user is near a location that's in the Foursquare database, one can instantly access any comments people have left and get recommendations based on proximity. If a user checks in several times at a certain location, he/she can become a “Mayor” of that place. Suddenly, Foursquare becomes a bit of friendly competition as users try to claim and reclaim mayorial status. The best part about Foursquare is that it isn't just for individuals. Businesses can partner with Foursquare and use the service to attract new customers. Besides Foursquare the other popular applications are: **Gowalla, Loopt & Yelp**. Different kinds of innovations are being tried in the LBSN space (and perhaps many more to follow):

- **TuneWiki:** It is a consumer media application that allows people to experience music with others in their social network. It allows the listeners around the world to listen to their favorite music as well as listen to what others are playing. TuneWiki MusicMap allows the users to navigate on the Map and see what other users are playing at different locations around the world.
- **Qik:** It enables live video casting from a cell phone via any 3G/GPRS/Wi-fi Internet connection. It also provides a mash up on the maps and hence it tells about the location from where the feed is being generated. The users can form communities on the website of Qik to get comments on their video and can follow other Qikkers. Considering the much hype and hopla about “Citizen Journalism”, Qik is one solution where a user can start broadcasting an event live say Commonwealth Games in New Delhi using their 3G enabled handset.

Over the next decade, systems which create and store digital records of people's movements through public space will be woven inextricably into the fabric of everyday life. While on the contrary, LBSN users maybe apprehensive of this fact and link it to the loss of privacy. To counter this LBSN have provisioned for a feature called as location privacy i.e. the ability of an individual to move in public space with the expectation that under normal circumstances their location will not be systematically and secretly recorded for later use. Another key aspect for the success of LBSN is the technological (using GPS, A-GPS or hybrid techniques) ability to accurately map the users' location within a range of 5-50 meters.

Location based Mobile Social Networking The upbeat *Monetizing* model in the making

The hype around the location based mobile social networking is certainly not in the absence of a good business model. It is emerging as a win-win proposition for all the players in the value chain.

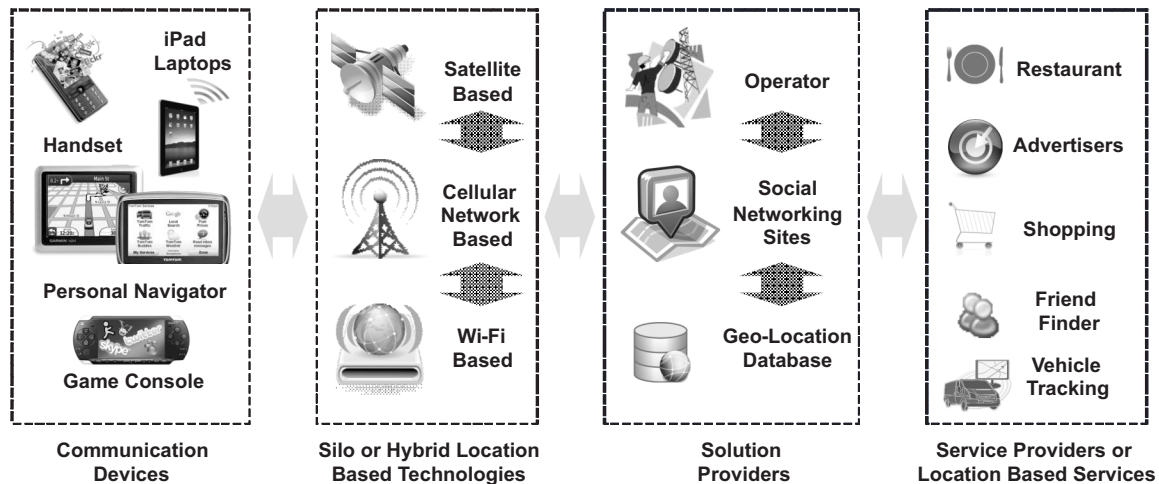


Figure 5: Value chain of LBS based on SNS

Perhaps the biggest asset for any social networking site is its registered users. Facebook alone caters to more than 500 million registered users. SNS can also monitor and track the users who are more connected than the others in the network; also the relative activity level per user to know if he/she is a listener (passive user) or an influencer (active user) within their respective micro-networks. Some of the primary value earners for social networking sites are as follows:

- **Flyers / Banner Sales:** Banner Ads are provided to advertisers at the top, bottom or side panels of users' profile page. Though efforts are also taken to ensure they remain non intrusive to the users viewing experience.
- **Sponsorships:** SNS try to grab the user's attention by showcasing Ads related to a campaign or an event: Example: Aircel can promote their save the tiger campaign through SNS.
- **Sponsored Groups:** Group creates a branded, personal environment where users can gather and interact. SNS offers subscription to various kinds of groups. Example: A fan club dedicated to McDonalds' lovers to discuss about her products or services.

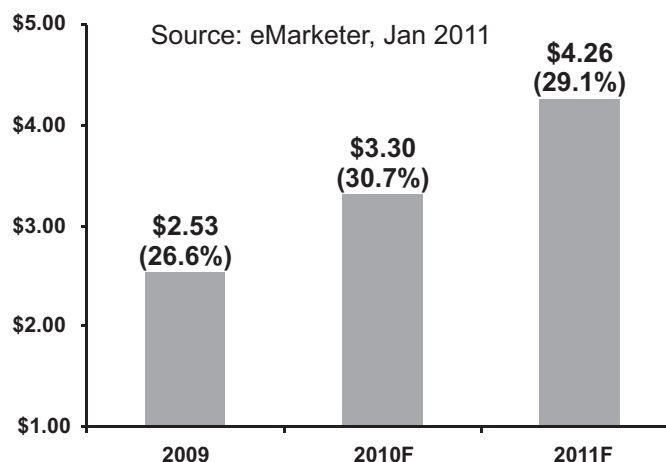


Table 6: SNS based advertising revenue estimates by eMarketer, Jan 2011
(Social networks worldwide are estimated to bring in \$4.26 billion in advertising dollars in 2011, according to updated estimates by eMarketer)

- **Affiliate Sales:** SNS often recommends other products/brands or services and in return get aptly awarded. Example: SNS while making their users aware of the consequences of a Virus Attack through a small story board may also recommend a solution or a service provider towards the end of the story.
- **Data & Survey:** SNS perform market survey with their online users and pass on the valuable customer / prospect information to the product / service companies. Example: An airline ticketing portal may resort to an online marketing survey with the help of SNS before launching her services in the market.
- **VAS:** Various kinds of subscription based or download type of value added services maybe promoted directly to the user. Example: Indiatimes prompting the user to download the ring-tone of a recently released movie.
- **Mobile based Alerts:** Telcos are immensely benefiting from the SNS by collaborating with them to provide more value add to their subscribers. Thus realizing more revenue by means of SMS (based alerts, notifications or micro-blogging), enhanced usage of GPRS/data services, and increased subscription to applications/VAS. Above all Telcos are also able to create the much needed market differentiation and support customer retention.
- **Retail:** Advertisers also promote merchandises to the online users like apparels, electronics, etc which can be purchased online by directing the user to the vendors' e-commerce portal. Example: Vodafone may promote their Zoozoo merchandise.

Gaming & Virtual Goods (Gifts / currency): Games are popular assets over SNS; so much so that the online game loving community is willing to shell out extra bucks to purchase virtual goods over these sites. Example: Game savvy users buy virtual currencies to enhance the gaming experiences.

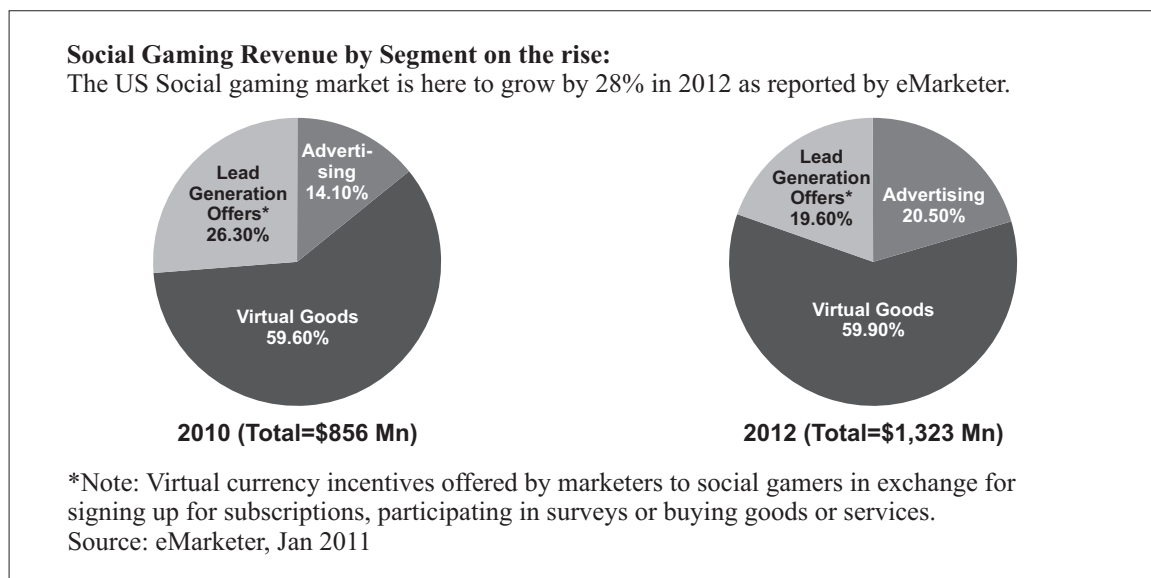


Table 7: Social Gaming Revenue by Segment
(The US Social gaming market is here to grow by 28% in 2012 as reported by eMarketer.)

- **Applications:** SNS allows developers to build their own applications and lets them showcase it over their portal. The success of such applications is highly dependent on the application's virality and its user base. Example: Developers promote several applications for the iPhone users.
- **Premium Memberships:** Some of the SNS (like LinkedIn, Ryze) offers privilege services to their users by means of premium membership fees.
- **Location based services:** LBSN provides a good opportunity to earn revenue from service providers. Example: Foursquare has created a dashboard for local businesses that want to offer mayor specials and other rewards to people who check-in:
 - Total check-ins
 - Unique visitors
 - Gender percentages of check-ins
 - Top Visitors
 - Most Recent Checkins
 - All Checkins (detailed listing of all checkins)
 - Time Breakdown (when users are checking in)

It can be very useful to take the Foursquare dashboard data and create a historic record of daily, weekly, monthly, quarterly or even yearly data points. Once the model matures, Foursquare may start charging for the service.

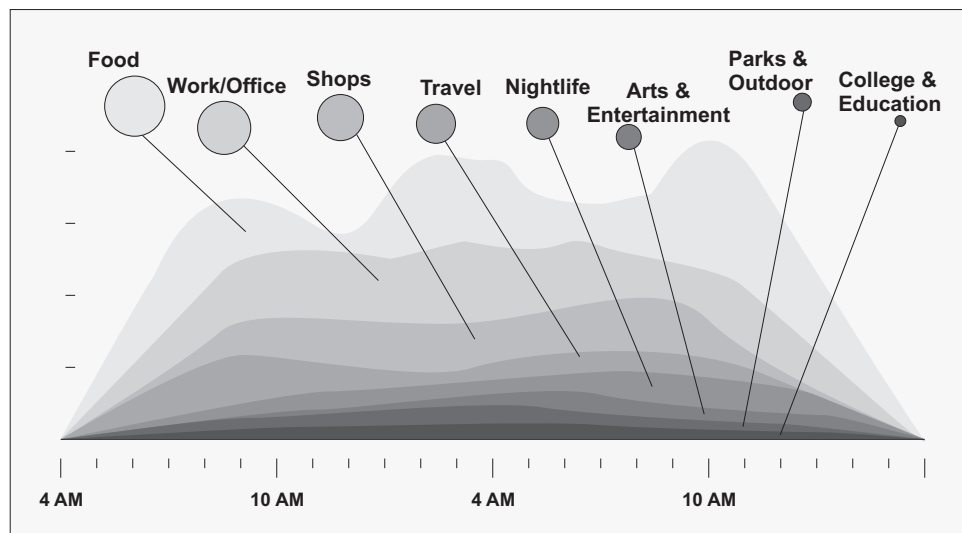


Table 8: Check-in by Category throughout the day:

(Foursquare US statistics reveal the top categories by user preference: Food, Workplaces / offices and Shopping destinations. Check-ins are peak between 12 and 2PM, as well as, 6PM and 8PM)

Security & Privacy over Social Networking - A behavioral or a technological issue?

J L Baird never would have imagined that his great invention (i.e. the Television) would be referred to as the “Idiot Box”. The point is that even popular inventions or innovations may have a flip-side which might make them unpopular. Similar is the case with these social networking sites. More often one would read or hear about the security and privacy aspects related to these sites than their burgeoning user

base. Identity theft (impersonation), character assassination, privacy intrusion, sexual predation, vulnerability & exposure of personal information are just a few to quote in this context. Security and privacy “may be” a behavioral issue rather than a technological one. Many of these sites are evolving their policies to provide added features and protection to the users; yet it is the prerogative of the user to make necessary use of these features. And many a times, people become aware or get proactive only after an uncanny incident has happened with them or their peers. Therefore, users should demonstrate self-restraint and share only the required information over this “public” (and not “private”) medium of communication & interaction.

Conclusion:

Contextual and location-targeted advertising, combined with premium services and virtual goods may provide a means of effectively monetizing this medium of social networking. While mobile technologies and devices are providing a new fillip to this wave of socialization; location-based features have opened up a bouquet of services that may be offered through the SNS.

Study of the World map of Social Networks (Source: Alexa & Google Trends for Websites traffic data, June 2010) reveals that for Indian landscape has changed over the last one year. Facebook now rules the roost and has outpaced Orkut. And this is perhaps one of the global trends in the SNS space. Few countries have advanced significantly in SNS; while few are following suite (laggards). What's important to note is the fact that the user behavior in this space is somewhat consistent across the globe. It would certainly mean that the e-social revolution, the mobile-based social revolution and the location-based social revolution would sweep across all the developed and developing economies of the world sooner or later.

We need to take cues from the global phenomenon and act locally. In India, the social revolution has already started taking shape over the last 5 years. The mobile growth is providing the much needed momentum to carry forward this revolution. We are also witnessing increase in traffic to these SNS (as historically seen in some of the socially advanced countries). LBSN is another wave that India would be riding on. These innovative initiatives have defined a win-win monetizing model for all the players in the value chain—device manufacturers, technology providers, operators, social networking sites and service providers. It would be interesting to see if the hype around location-based social networking over mobile devices would become passé or it would emerge as the next big revenue earner. Innovation & adaptability would be the two key factors that would determine the success of all players, come what may.

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Customer Acquisition Form Management & Subscriber Verification

By :

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Abstract:

In modern day telecom ecosystem, mobile operators have hived off non core business areas and have concentrated solely on their core business of customer acquisition and management. The Department of Telecommunications (DOT) and Telecom Regulatory Authority of India (TRAI) have issued guidelines, with respect to, verification of subscribers at the time of acquisition, such as, obtaining and verification of Proof of Identity (POI) / Proof of Address (POA) from the subscribers. The compliance of these guidelines is mandatory for every operator. For dealing with frauds, the telecom company should have practice of verifying the original documents, proper address and credit verification of customers, so that, there is minimal possibility of such an event occurring. The Government of India had created Vigilance Telecom Monitoring (VTM) cells to address the issue of illegal telecom operations in the country. As of today there are 34 VTM cells operating in the country and they have been rechristened as Telecom, Enforcement, Resource and Monitoring (TERM) to reflect their entire gamut of operations. Monthly compliance reports, consisting of subscriber data, bulk connections etc., have to be submitted by the telecom operators failing which they are liable for fines imposed by the DOT. Therefore, customer acquisition and subscriber verification has emerged as one of most important functions performed by the communication service provider in the telecommunications industry today. This paper aims to highlight the various processes involved and the internal checks and balances that should be institutionalized by the operators keeping in mind the TRAI guidelines.

Introduction:

The Communication Fraud Control Association (CFCA) defines fraud as the use of telecommunications products or services with no intention of paying. IDC estimates more than 200 variants of telecom fraud and the number is likely to go up with the advent of 3G services. It is estimated that approximately 4.5% of an operators' revenue is lost due to frauds. Subscription fraud is among the most common type of fraud affecting the operators' revenue. Approximately \$22 billion has been lost by telecom companies worldwide due to subscription related fraud.

Subscription fraud may further be categorised as such whereby a subscriber obtains a connection using fraudulent documents and secondly, after obtaining a connection by providing correct documents, the subscriber runs up a huge bill with no intention of paying. As it directly affects the operators' revenue, it

is imperative that the company has efficient checks and controls institutionalized in the organization to prevent such events from taking place. In the Indian context, and in most places now worldwide, the verification of subscribers also has security implications attached to it. In India, the Department of Telecommunications (DOT) has issued strict guidelines for the verifications of subscribers at the time of acquisition by operators failing which they are liable to pay fines to the relevant authority.

Internal Audit is being widely accepted by the operators in India as an efficient control device for operational and process review. The auditor must know of the technical and commercial aspects of the operations in the particular enterprise and devise probing tools and techniques to evaluate the said processes and evaluate whether the company has adopted requisite practices.

Customer Acquisition Process

The Customer Acquisition Process for a pre-paid connection is described below with a step-by-step process. It must be noted that some of the steps may vary from operator to operator.

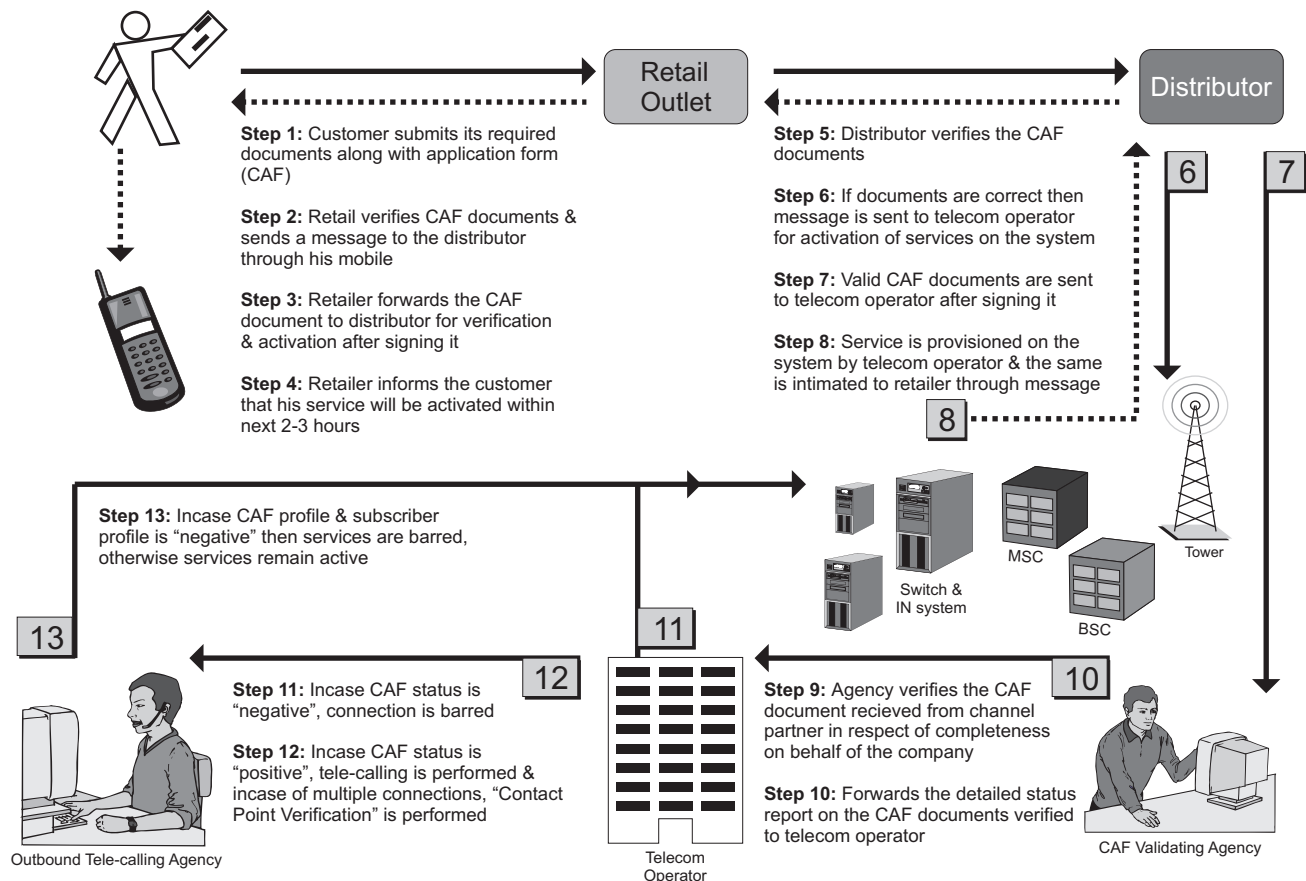


Figure1 : Customer Acquisition Process Flow

Term Cells & Submission Of Reports

The erstwhile Vigilance Telecom Monitoring Cells (VTM) was rechristened Telecom Enforcement, Resource & Monitoring (TERM) Cells, to reflect their entire gamut of functions, with effect from 5th August, 2008. As on date, there are 34 TERM cells operational in the country.

Since TERM cells generate the mobile subscribers' list for audit every month after getting the data base from the Service Providers, the Service Providers are bound by license conditions to generate an updated dump of all subscribers without leaving out any category whatsoever preferably on the last day of the month. As per instructions issued vide DOT Letter No. 842 725/2005/157 dated 23rd March, 2009, the following time limit shall be adhered to against requisition from security agencies / TERM cells:

Subscriber Data Record	1 Hr, in all cases of subscribers acquired before 15 days and in other cases where subscriber data has been updated
	24 Hrs, in case of subscribers acquired within 15 days
Copy of CAF	In 72 hrs, during 3 months from now
	In 48 hrs, during subsequent 9 months
	In 1 hr, after one year from now

Table 1: Time limit for the various types of requisition from Government agencies

A single CAF, duly signed by Authorized signatory of the company shall be submitted while applying for mobile connections in bulk. The Service Provider shall maintain the updated database of such mobile connections and provide the database as and when required by the licensor or authorised security agencies. Provision of 10 or more connections for single use or single location is generally accepted as bulk connection.

In case of foreign tourists, apart from details of local reference, copy of Passport with valid Visa stamp therein shall be acceptable for issuing mobile connections. The Service Provider should be immediately able to furnish such details.

As per instructions issued vide Letter No. 1-34/2006-V.I (Pt.) dated 30th April, 2008, the sample size for verification audit was increased from 0.02% to 0.1% to represent the true population of subscribers with additional provision of bulk sampling. This requires submission of copies of acquisition forms along with documents (POI & POA) submitted by the subscriber. The penalty for subscriber verification failure cases, as per instructions issued vide Letter No. 800/52/2008-VAS-III dated 24th December, 2008, is as follows:

Correct Subscriber Verification % in a Service Area	Amount of Financial Penalty per unverified subscriber
Above 95%	Rs 1000/-
90% - 95%	Rs 5000/-
85% - 90%	Rs 10000/-
80% - 85%	Rs 20000/-
Below 80%	Rs 50000/-

Table 2: Time limit for the various types of requisition from Government agencies

Role of Internal Auditor

The Internal Auditor should establish that the company has proper controls for verification of identity and address of the subscriber, at the time of customer acquisition, so that compliance with DOT guidelines is ensured. A connection taken through fraudulent documents has serious security implications in addition to loss of revenue to the company.

The Auditor should have the various databases, containing subscriber information, maintained by the company and her partners such as the Address Verification agency and the Information Technology department which maintains the Customer Relationship Management application. These databases, i.e. HLR dump, AV agency dump, CRM & IN dump, should be reconciled as on a certain date pre-decided for the audit purpose. The exception should be duly noted and brought to the notice of the Service Provider. A sample should be drawn from the above mentioned databases, the number to be decided as per the agreement between the auditor and the company, for further examination of the physical copy of the CAFs.

The CAFs should have the following documents attached:

- 1) Proof of Identity
- 2) Proof of Address
- 3) Photograph

The Auditor should take note of the following salient points while examining the physical CAFs:

- 1) The photograph on the CAF should be cross signed by the subscriber
- 2) A clear photocopy of POI & POA should be available with the CAF
- 3) The photograph should match with the photograph on the POI
- 4) The Customer details should be filled up correctly and should match the POA details

As per instructions issued vide Letter No. 800-04/2003-VAS (Vol.II) dated 22nd November, 2006, it is the responsibility of the authorised personnel at the POS to record that he has seen the subscriber and verified his documents with the original. As a result, a declaration to this effect must be present in the CAF using a stamp or a clause in the agreement.

The connection should be only activated after all the requirements have been fulfilled by the customer and the date of activation in the system and the CAFs should be checked for any discrepancies. Pre-activated SIM cards are not to be sold in the market and invite the highest penalty of Rs 50,000 on each such connection as per DOT instructions vide Letter No. 842 725/2005/157 dated 23rd March, 2009.

The Auditor should be aware of the POI & POA allowed by the DOT to obtain a connection. These are regularly updated by the department and the Service Provider and their partners should have a list of the valid documents. DOT Letter No. 842-725/2005-VAS (Pt.) lists all the documents for mobile subscriber verification. Additionally, the Auditor should separately request for additional CAFs of Foreign Nationals and Outstation Subscribers if not already drawn in the original sample. For Outstation Subscribers, the details of the local reference shall be obtained and verified telephonically at the POS and cross verified by the Service Provider as per instructions issued vide Letter No. 842-725/2005/157. As mentioned in the same letter, foreign nationals need to produce the copy of Passport with valid Visa stamp apart from a local reference/address of stay.

Warehousing of the CAFs is a very important facet of the CAF Management process. As this function is outsourced by the Service Provider to its partners, it is important for the Auditor to study the agreement between the CAF Agency and the Service Provider and check whether the agency is complying with the terms & conditions mentioned in the agreement. The Auditor should visit the warehouse and understand the scanning & archival process. The warehouse should have a system of indexing for easy retrieval of the CAFs. This can be verified by asking for a few CAFs at the time of the visit and comments on any delay should be documented.

The Auditor should verify if the adherence to the barring process is being complied with if the CAF is not received within the number of days as per approved circle policy. As per DOT Letter No. 842-725/2005/157 dated 23rd March, 2009, where a CAF is non-compliant for a mobile connection, either proper CAF should be produced within 72 hrs or else the connection deactivated. It imposes a penalty of Rs 50,000 on each such connection, in addition to penalty for non-compliance during subscriber verification.

Sample Observations

- In a survey done on one of the operators in the country the following observations were noted. These observations are from operations in only one of the circles in the country.
- Bulk Connection tagging was not being adhered to in the system. Reliance on manually tagging bulk connections has severe limitations and a larger likelihood of missing bulk subscribers.
- Discrepancies were noted in the number of subscribers in the database maintained by the AV agency, HLR and CRM. For instance, approximately 600 active subscribers in the HLR had no corresponding records in the AV agency and CRM databases both. Further, approximately 27000 active subscribers in the HLR were not present in the CRM.
- Only 15% of the CAFs had been scanned and uploaded in the database.
- Of the surveyed CAFs, 2% of the CAFs had an activation date on the acquisition form later than that on the CRM database. This points to a pre-activated SIM and is liable for penalty.
- 12% of the CAFs had no dates mentioned on the acquisition form and a further 3% of the forms had

perceptible POI mismatch.

Based on the guidelines and the observations, the following checklist can be used to conduct a CAF audit. The parameters mentioned in the checklist are only indicative in nature and attributes can be appended/ deleted based on the discussion with the operator and internal controls and checks that one wants to implement.

Attribute / Parameters	Observations
Sample Subscriber Name	
Mobile No	
Date of Activation as per HLR / CRM / AVAM	
Date of Activation as per CAF	
CAF Serial No	
Whether CAF completely filled	(Yes / No)
Photograph of Customer Affixed on CAF	(Yes / No)
Photograph cross signed by customer	(Yes / No)
Approved Identity proof available	(Yes / No)
Attached Identity proof corresponds with customer details on CAF	(Yes / No)
Approved Address proof available	(Yes / No)
Attached Address proof corresponds with customer details on CAF	(Yes / No)
Retailer signatures and stamp for original and subscriber verification available	(Yes / No)
Distributor stamp & signature available on CAF	(Yes / No)
Comments (any other observation about the CAF)	

Table 3: Check list for CAF audit

References:

- 1) DOT Letter No. 800-04/2003-VAS/112 dated 10th May, 2005
- 2) DOT Letter No. 800-04/2003-VAS (Vol.II)/104 dated 22nd November, 2006
- 3) DOT Letter No. 1-34/2006-V.I (Pt.) dated 30th April, 2008
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- 5) DOT Letter No. 842-725/2005/157 dated 23rd March, 2009
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Outsourcing in Telecom Industry: The Road Ahead

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Abstract:

The telecom industry is through dynamism in the form of cost cutting and branding occupying centre stage. With stabilizing Average Revenue Per User (ARPU), increasing teledensity and high churn rates, telecom operators are looking at profit maximization by outsourcing non-core operations to make up for their competitive plans offered to customers. Telcos are outsourcing each stage of their Customer Life Cycle (CLC) to different vendors through strategic partnerships, shared services and managed services. Multi level outsourcing is also being replaced by single vendor offering integrated services. For example, IT companies developing own billing systems or acquiring sub vendor companies to overcome the threat of billing system providers jumping into Billing Support System (BSS) services. IT companies that offer billing services to more than one operator and would follow standardization of processes in their service delivery platform (SDP) to maximize profits.

Off shoring and best shoring have gained momentum in telecom with hotspots being identified as India, China, Philippines and some parts of Latin America, based on cost and labour arbitrage and government regulations. It is envisaged that with Long Term Evolution (LTE) in the offing, operators are looking into all avenues to increase their global presence and leveraging Capital Expenditure (CAPEX) and Operating Expenditure (OPEX).

Introduction:

With stabilizing Average Revenue Per User (ARPU), increasing teledensity and high churn rates, telecom operators are looking at profit maximization by outsourcing non-core operations to make up for their competitive plans offered to customers. Almost every organization outsources in some way. Typically, the function(s) considered for outsourcing are non-core to the business operations of the company.

Outsourcing enables a customer to offload the operation of information technology (IT) systems and processes in order to focus on core business functions. Through outsourcing, clients gain cost-effective and flexible information technology solutions that enable them to rapidly respond to changing business needs and freeing them from the demands of keeping pace with technological change.

Cost cutting is the primary driver of outsourcing, with outsourcers spreading the costs of infrastructure,

technology and personnel across multiple vendors. Outsourcers might buy the vendor's assets, transfer the employees to their payroll and agree on performance oriented service level agreements.

An organization's operations can be broadly classified into core and non core activities. Since core activities are the core competency of the company, they are always managed as in house operations, where as, non-core activities are outsourced to get best results.

Non core activities can be broadly classified into data processing, administrative operations and data centres, each of which can be outsourced to different vendors or to a single vendor. A company always does its core processes in house.

The following diagram shows the non- core and core processes of an organization and that they are outsourced or managed in-house respectively.

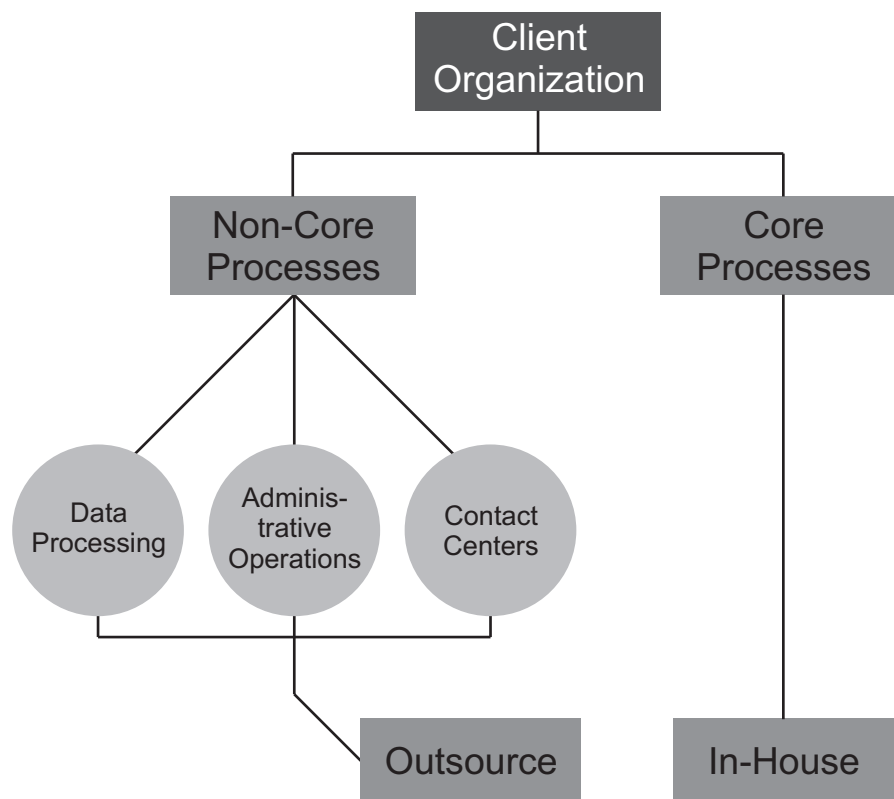


Figure 1: Classification of non- core and core processes

Reasons for outsourcing:

With increasing level of operations and huge customer base, the telecom operators are looking at cost cutting and flexibility of operations through outsourcing. There are short term and long term benefits that are reaped by companies by strategically planning their outsourcing plans.

The main benefits that can be achieved through outsourcing non core activities are:

- **Cost Cutting:** Outsourcing helps to reduce IT costs and improve the net revenues and the

shareholder value of the telcos.

- **Flexibility of operations:** Outsourcing helps the telcos in achieving the flexibility to transition and transform infrastructure and applications with rapid change in technology.
- **Improved Business Focus -** By directing a part of the work towards outsourcing, the Telcos will be able to focus on their core competencies and able to achieve targets faster.
- **Betterment of Services:** Outsourcing ensures that the outsourced function is done by the best person/company in the industry and hence improves the services offered by the telcos.
- **Risk Management** Outsourcing jobs to an expert company will help mitigating the risks associated with the telecom operator. As the company grows risks appear and outsourcing will help to check unforeseen risks as well.

General functions that are outsourced:

- All support functions like customer support, data centres
- Activities not belonging to company's core competency
- Help desks
- IT functions like Operation Support Subsystem, Business Support Subsystem
- Field staffing

Trends in outsourcing

As the service levels in telecom get complex with advancements in technology, huge customer base and cut throat competition, the telcos are forced to lookout for new trends and practices to counter these challenges.

According to Mckinsey, more than 70 percent of globally operating offshore delivery centers of the telecom operators including both wholly owned captive operations as well as vendors have been narrowed down to just three locations- India, China or the Philippines. This reliance on a limited number of geographic regions is driven by the availability of highly skilled, low-cost labor in these areas.

The key trends in outsourcing are identified as below:

- **Outsourcing segments:** Outsourcing is found to be more prominent in traditional areas like customer care, financial services, manufacturing, IT, IT Enabled Services (ITES). The general trend is that the operations that are non-core to the operations of the telcos and those operations which can be performed by vendors better are usually outsourced.
- **Captive BPO units:** Large multinational companies Etisalat, IBM, HP are investing in captive BPO

units in supplier countries in multiple locations, to reduce risk and control quality of operations.

- **Result-oriented approach:** Outsourcing is becoming more sophisticated. Telecom operators are looking for business process excellence, speed to market, improvement in quality, benchmarking to world-class standards. There is also increasing global competition and pressure on margins from emerging lower-cost outsourcing destinations.
- **Location specific risks:** The telcos maintain offshore mostly in three countries- India, China and The Philippines. This way, they are exposed to location-specific risks. These include abrupt currency and wage fluctuations, intense competition for employees, and regulatory limits. While a narrow geographic concentration may result in lower labor costs at the outset, the overall risks are higher. Risk factors for outsourcing like terrorism and war, disaster and disease make contingency plans a necessity for telecom operators.

General challenges in outsourcing

- **Network complexity:** Networks are more complex with rapid advancements in telecom technologies like 4G and LTE. There are multiple layers of devices (optical/physical, Ethernet, IP) and more devices per layer. Long Term Evolution (LTE) and 4G also pose a great challenge for economical deployment.
- **Service Complexity:** Services are becoming more complicated because they require coordinating more devices. The number of standards is ever increasing, moreover the interpretation of each standard is becoming even more complex.
- **Business considerations:**
Declining ARPUs are a hit to the profit levels of the telcos. Saturation of markets with constant teledensity is also a factor that will influence the telecom trends.
- **Conflict of interests:** Outsourcing might often lead to conflicts of interest and issues with confidentiality. Problems with data security and intellectual property rights (IPR) are also potential challenges that are faced in the telecom outsourcing environment.
- **Loss of control:** Outsourcing might lead to loss of control of the outsourcer, which might lead to deterioration in quality of the work. This may end up costing more than the original case of doing the job in-house.

Disaster recovery in telecom :

Disaster recovery is defined as the set of processes cum policies cum procedures that go into the recovering and continuation of technology-related infrastructure that is critical to the basic functioning of the telecom operator in the event of disasters that are natural or deliberate.

As most of the software and hardware operations of the telcos are outsourced, enough care must be taken by the telcos to frame a proper DRP to avoid huge risks and losses due to outsourcing. Thus Disaster recovery is very indispensable for telecom operators who outsource part or the whole of their operations.

A disaster recovery plan (DRP) - sometimes referred to as a business continuity plan (BCP) or business process contingency plan (BPCP) - describes how the telecom operator has to deal with potential disasters. A disaster recovery plan consists of the precautions taken so that the effects of a disaster will be minimized and the organization will be able to either maintain or quickly resume mission-critical functions. Typically, disaster recovery planning involves an analysis of business processes and continuity needs and it also includes a significant focus on disaster prevention in some cases.

Like all other operations, disaster recovery also could be outsourced. But it is riskiest of all to outsource disaster recovery than any other operation of the company.

Standardization of processes

Outsourcing operations to strategic partners and other vendors are necessitating standardization of the operating methodologies and processes irrespective of where the business process occurs. The telecom operators must agree on and draft out all the activities that form a part of their business processes. The telecom industry is responding slowly in creating and formalizing the standard process reference models.

The supply chain council created supply chain operations reference (SCOR) model is followed by several companies. Efforts like this will ensure companies to agree on what it takes to fulfill a business process with the outsource vendors.

Advantages:

- **Preventing conflict of interests:** Standardization of processes will help in preventing conflict of interests with the vendors as a detailed process framework has already been identified for the outsourced service.
- **Risk Management:** Standardization also helps in identifying potential risks for the operators and the vendors as a part of the outsourcing contract and mitigating the risks on time
- **Cost and Resource management:** A standardized framework followed in telecom outsourcing will help in proper allocation of resources and thus help in managing cost overshooting, thus giving cost arbitrage.

Off shoring and best shoring have gained momentum in telecom with hotspots being identified as India, China, Philippines and some parts of Latin America, based on cost and labour arbitrage and government regulations.

Factors for consideration:

The following factors are evaluated before considering a country for offshoring or outsourcing work:

1. **Knowledge Pool:** It is assessed whether the country has good pool of well educated and knowledgeable people.
2. **Cost:** The operating costs in the country have to be significantly cheaper than the present country of operation.
3. **Quality of Output:** The prospective country should provide quality of work, efficiency of operations for the outsourcer.
4. **Rule of Law:** The government and its regulations impact outsourcing very significantly in choosing an outsourcing hotspot.
 - a. Regulations: The government regulations that are in implementation across the outsourcing industry are very critical in evaluating a outsourcing hotspot.
 - b. Intellectual property: The country should have proper intellectual property rights (IPR) and data security in practice. Absence of this will result in conflict of interest between the outsourcer and the vendor, data privacy and security issues.
5. **Infrastructure:** A country should provide good infrastructure facilities, both physical and communications, to enable cost effective operations. The infrastructure not only needs to be cost efficient, but also technologically advanced.
6. **Language:** Language is a very main consideration taken by companies while a vendor is chosen. Support of different languages and language of the outsourcing country will be an added advantage for outsourcing jobs in the hotspot.
7. **Time zone:** Geographic nearness or location proximity of the hotspot to the outsourcing country is an added advantage when nearness of time zones is considered between the outsourcer and vendor countries.
8. **Growth rate of the economy:** The economical advancements of the destination country are also a fairly important factor for considering offshoring options.

Arbitrage

Arbitrage is defined as the practice of taking advantage of a price difference between two or more markets. The following graph shows the cost arbitrage in various countries. Values in the Y axis show the favorability of cost reduction. Value 0 means the country offers least cost savings and value 1 means the country provides more cost savings.

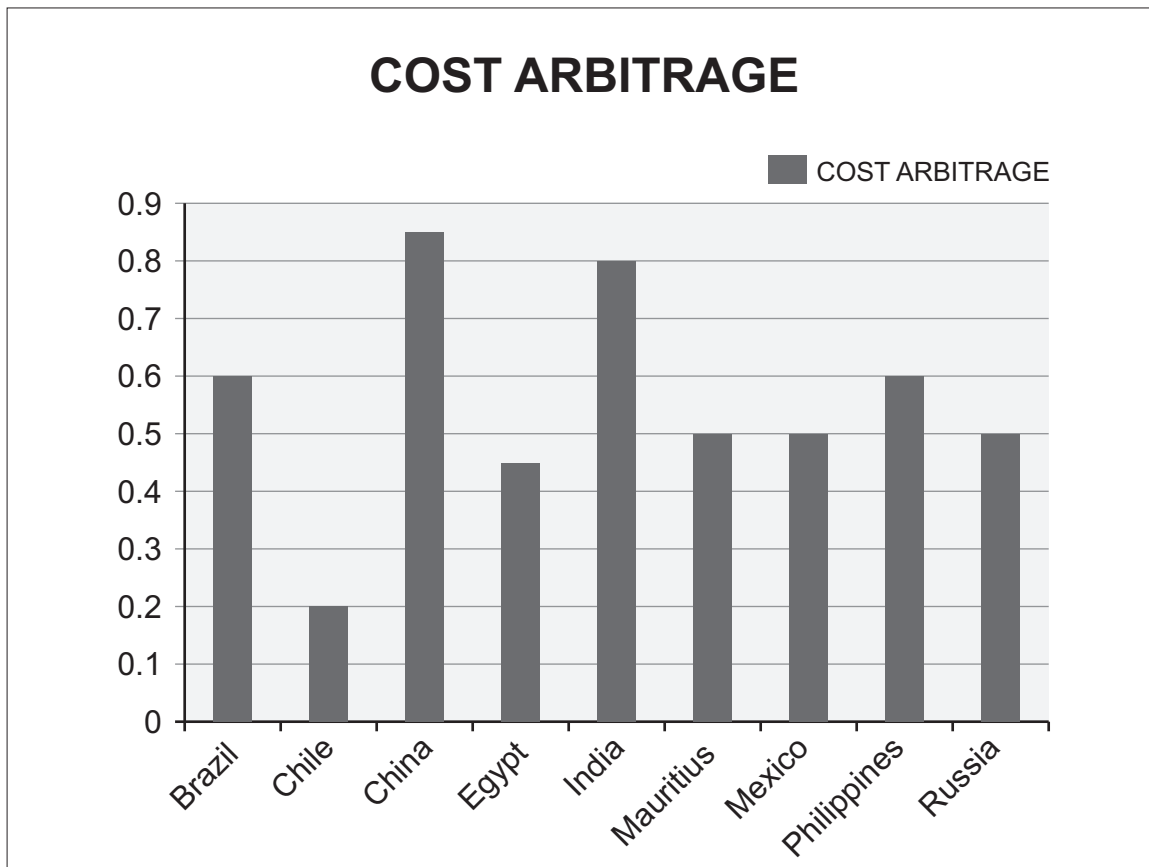


Figure 2: Cost Arbitrage for Various Countries

The following graph shows the regulatory support offered for outsourcing activities in various countries. Values in the Y axis depict the favourability of the regulations. Value 0 means the country has stringent regulations and value 1 means the government regulations are most favorable for outsourcing.

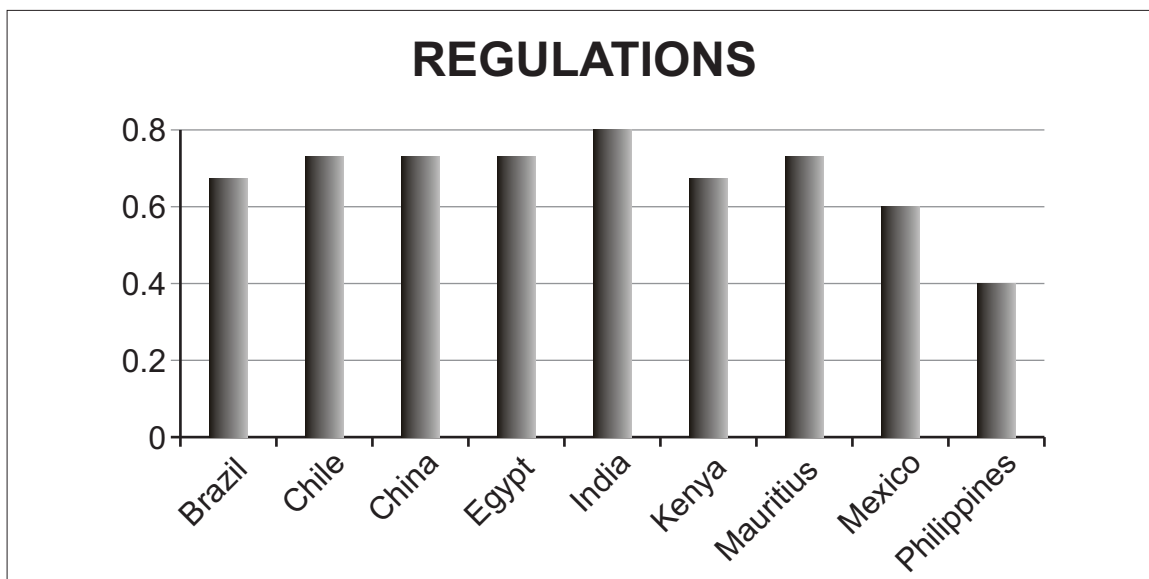


Figure 3: Favourability of Regulations Across Various Countries

Trends in Indian Telecom related to Outsourcing

- **Outsourcing:** Outsourcing involves general contracting of non-core services like billing, managing service delivery platform, customer care, and data centre management to telecom vendors. Eg. For vendors IBM, WIPRO for Service delivery Platform and billing, Firstsource and Mphasis for back office and call centre operations.
- **Infrastructure Sharing Active and passive**
This involves sharing of common resources by one or two telcos for cost cutting measures.
Passive Sharing - Tower sharing e.g. Idea, Vodafone and Airtel who own Indus towers jointly.
Active sharing - sharing of active infrastructure e.g. switches, routers in the backbone network.
- **Managed services**
A managed service involves providing of delivery and management of network-based services, applications, and equipment to enterprises, residences, or other service providers. It usually includes providing IP telephony, firewalls, virtual private networks, call centres etc.

Outsourcing Value Added Services (VAS)

Indian mobile VAS industry is valued at more than \$1.4billion today and is forecasted to touch \$4billion in the next 5 years. This presents a huge opportunity as falling Average Revenue Per User (ARPU) can be neutralized by increase in revenue from VAS. The industry is predominantly dominated by entertainment services such as mobile music, ring back tones (RBTs), wallpapers and plain SMS. The major revenue generation from VAS is through short messaging service(SMS) which comprises of almost 44% revenues. This makes the high and mid segments attractive from the point of view of the telecom operator because poor literacy rate in India is a barrier for the low segment which does not contribute to the revenue generation under VAS. The VAS content thus has to be modified to provide high levels of customization to cater for the lower segment. This entails a lot of research and this falls under Capital Expenditure (CAPEX) of the telecom operator. Under the managed VAS concept the managed VAS vendor takes it upon itself, to provide for high customization and product development. Even though the revenue model is then skewed towards the managed VAS vendor it results in higher return on investment.

The current industry trends show that it is not long before complete VAS operations will be outsourced. With Airtel introducing ComViva's virtual SIM cards, where calls can be made neither owning a mobile phone nor a SIM card, the enhancement in VAS is going to involve huge CAPEX and hence would be economical when outsourced.

The Future outsourcing model

There will be three levels of functioning for successful operators in future.

- a. Core services: Voice, data used and paid by end users
- b. Distribution platform: Third party delivery of access, data and voice
- c. VAS platform: Enabling services for third party providers

- **The core services:** These are the voice and data services that are offered to the users. Users pay for these services to the telecom operator as per their usage.
- **Distribution Platform:** This model means that the telecom operators will allow third party to provide voice and data management services on their behalf. Eg. IBM, Wipro provide services like Operation Support System(OSS) and Business Support System(BSS) which are part of the Service Delivery Platform(SDP).
- **VAS platform:** This model is relevant to the VAS content developers who create and manage content for telecom service providers. Eg. Content providers like ComViva, OnMobile, One97 managed VAS for telcos(Telecom companies)

The future telecom model:

The diagram below shows how the operator follows a two sided model to cater both to its upstream and downstream customers. The service provider plays a dual role: First, it sells service capabilities to its “upstream customers,” such as enterprises, banks, government, and media. Second, it becomes a retailer of the services created by these third parties to its “downstream customers,” namely consumer and enterprise subscribers. In this model, the SDP plays a role of B2B business platform.

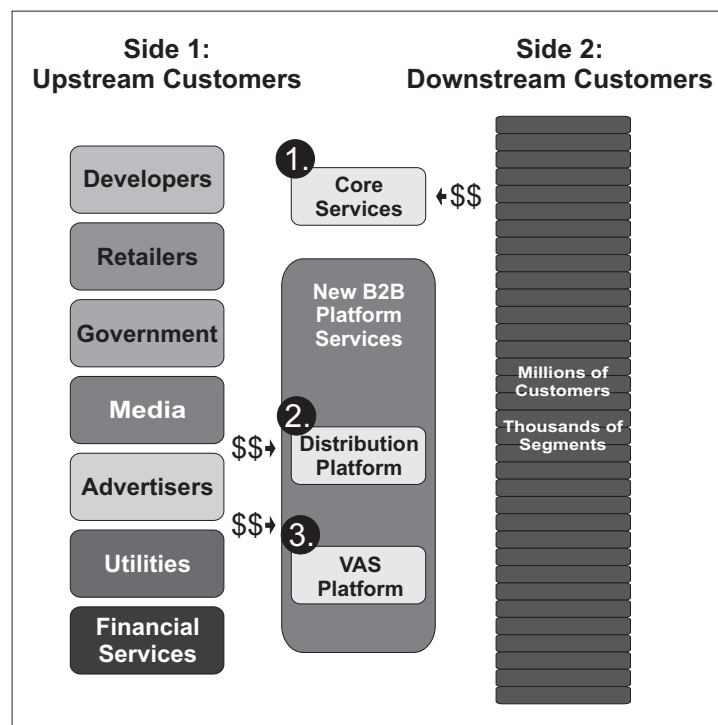


Figure 4: Future Telecom Model

Outsourcing through stages of the Customer Life Cycle(CLC):

Telecom Customer life cycle(CLC) is defined as the period for which the telecom service provider can retain a customer. It describes the steps a customer goes through when selecting, purchasing, using, and

all the way through disposing of a product or a service.

CLC describes the progression of the customer from a first time user to a brand loyalist. Cost cutting in telecom is usually done in various stages of the customer life cycle. So, to analyze cost cutting in telecom outsourcing, it is imperative to know the various stages of a customer life cycle.

The stages that a customer goes through when considering, purchasing, using, and maintaining loyalty to a product or services are:

- a. Presales
- b. Customer acquisition
- c. Network and maintenance
- d. Credit and collection

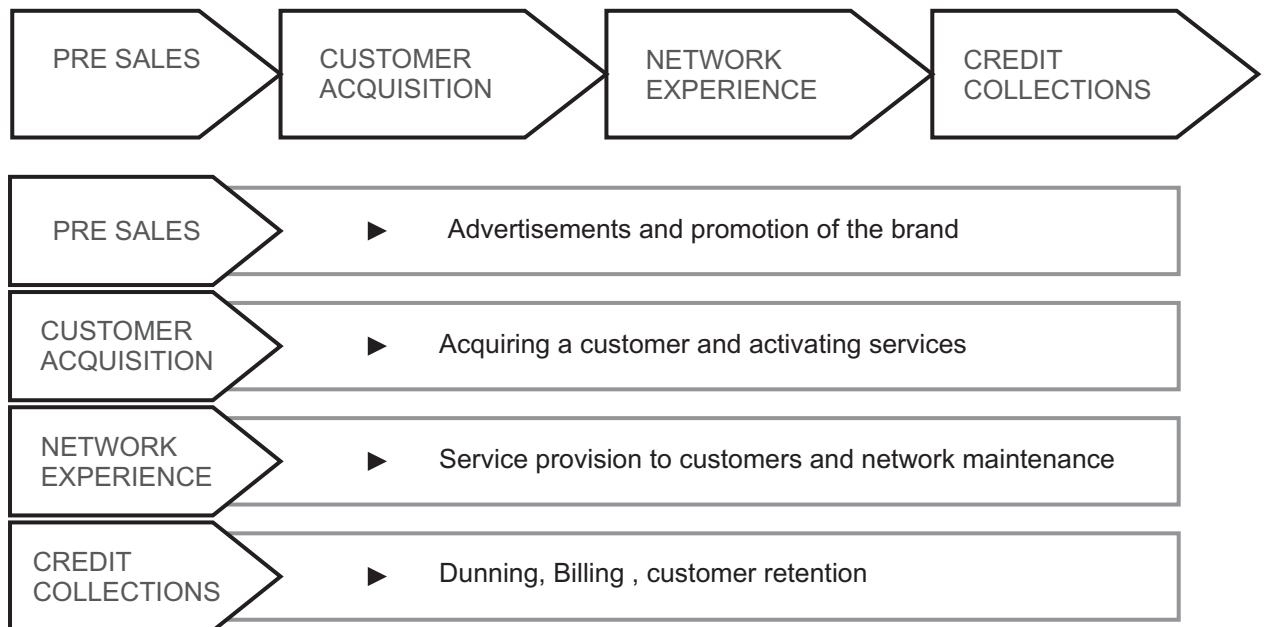


Figure 5: Telecom Customer Life Cycle

The near future of the telecom industry:

- Saturation of voice and shifting to data with 4G
- Strengthening core competencies and outsourcing other services
- Exploring untapped markets and global branding

Methods to cost cutting in telecom:

- Outsourcing to multiple vendors Captive locations for strategic operations, outsourcing the rest. Declining ARPUs has become a threat to new entrants as well pose a problem to existing players to sustain the business. Every operator is more focused on VAS and newer services and striving to control expenses. Outsourcing all except the CORE business is way forward and outsource to those who have core competency in those fields, hence a win-win situation
- **Product companies jumping into providing IT services:** Product companies which offer solutions as subcontractors to the IT service providers will foray into providing software as a service

in the near future. This poses a good amount of threat to leading IT service providers like Wipro who buy software products like billing solutions like Kennan and Operations Support System(OSS) solutions from product companies for their outsourcing projects

- **Containing CAPEX and OPEX:** Reducing capital and operating expenditure is the main reason for outsourcing by telcos. Rapid change in the infrastructure and It architecture due to technology advancements will be countered by outsourcing all operations except core. This will result in all the cost and potential risks associated with the upgradation to be borne by the vendor.
- **Data having higher priority:** When 4G is implemented, data will replace voice as the priority. Voice will be given for free by operators who will make revenues out of data and value added services.
- **Rule of VAS:** Customers will increase their focus on VAS and its associated offerings looking out for unique services. VAS will rule the industry and every provider will be differentiated by his VAS services for his success or failure.
- **Outsourcing of core functions:** Even though outsourcing is reaching new heights and almost every service is outsourced, Finance & Accounting is unlikely to be outsourced in the near future. This will be followed to prevent loss of control from the telecom operator's perspective.
- **Flexible pricing model:** Flexible pricing model will be adopted to reduce Capital Expenditure (CAPEX) risk in outsourcing models adopted by the telecom operators to outsource their non-core activities.

Conclusion:

Opportunities offered by the outsourcing hotspots overweigh the challenges posed. However, the challenges need to be taken into serious consideration before outsourcing to avoid unexpected risks and data or service theft. The main reasons to outsource are centered on falling Average Revenue Per User (ARPU) and rapid advancement of technology frameworks and practices. The differentiating factor for each telecom service provider (TSP) would be only Value Added Services (VAS). Companies will strive to achieve economies of scale to manage escalating costs and hence will resort to global expansion of the brand. Thus outsourcing has been, is and will be an inevitable part of the telecom industry.

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Billing for VoIP Services

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Abstract:

The backhaul and last mile telecom networks globally were designed to carry voice traffic on 64Kbps time slot. The same network was initially utilized for carrying data traffic. But with the growing demand for data, various standards have evolved that provide all IP (Internet Protocol) Networks like Next generation Networks (NGN) by International Telecom Union (ITU) and IP Multimedia Subsystem (IMS) by Third Generation Partnership Project (3GPP). With the implementation of all IP Networks at the core, telecom networks are now required to carry voice in form of packets. Traditionally voice call billing was done based on Metered Call Units (MCUs) which, was then replaced by Minutes of Usage (MoU) based on Call Detail Records (CDRs). With migration to all IP Network, VOIP calls are becoming very popular. But the billing of VOIP calls is very complex. This article with the help of generic VoIP architecture gives an insight into the options and steps involved in the billing of VOIP calls. It also explains the charging of VoIP voice calls that includes generation of call detail record, mediation for billing, rating and the invoicing process.

Introduction :

It is now well known fact that VOIP will gradually replace traditional telephony. Some industry analysts have predicted that in the near future telephony will be a free service offered as part of a bundle of services so as to incentivise customers to buy other services such as broadband access or Video on Demand (VoD)/Games on demand (GoD) services. In this way VoIP technology is set to significantly change the business model for telecom operators.

VoIP technology has often been considered as a way to make completely free phone calls. But all calls are not free. There are two main types of VoIP calls: computer-to-computer and computer-to-fixed line or mobile or vice versa. In many countries including India it is possible to call contacts for free when using a computer-to-computer service. However, VOIP calls terminated to fixed line or mobile are not free. Voice over IP has been implemented in various ways using protocols like H.323, Session Initiation Protocol (SIP). The adoption of these standards has made it possible to provide better Quality of Service (QoS). And so, whenever a higher QoS is demanded, calls would not be free, including computer (device) to Computer (device) ones.

Voice-over-IP (VoIP) is becoming an attractive value-added service that opens new revenue opportunities for broadband service providers both wired and wireless. Delivering voice telephony services together with data services over a converged IP network raises a few challenges:

- **Billing:** Unlike billing of broadband services which implements relatively simple billing schemes, voice billing is performed on per usage basis and demands greater detail and flexibility.
- **Quality:** Delivering VoIP and data over a converged IP network poses a risk to service quality and introduces a number of performance issues such as packet loss, packet latency or jitter. The aggregation of these quality impairments can be significant enough to affect customer satisfaction and churn rate. In particular, bandwidth consuming applications, such as P2P (peer-to-peer) and streaming, may congest the network links and jeopardize VoIP QoS.
- **Competition:** The technology of broadband networks allows any provider to offer VoIP services over any carrier's infrastructure, without investing either in network deployment or its maintenance.

Billing of VOIP services:

As stated earlier the billing systems have evolved from the traditional billing based on Metered Call Units (MCUs) which was replaced by Minutes of Usage(MoU) billing based on Call Detail Records (CDRs). However, with migration to all IP Network, VOIP services need to be billed. But the billing of VOIP calls is very complex and hence two approaches have been suggested for VoIP billing :

1. Price per minute business model
2. The flat-rate pricing business model

The adoption of IT will all depend on the operator's investment, competition, regulatory aspects & the factors like internet literacy and penetration. In long term the second approach of flat rate pricing seems to be most suitable but in the transition phase probably the first approach may hold good. In case of second approach the CDR generation and mediation for billing steps will be excluded from the VOIP billing process. Typical VoIP service provider offers free IP-to-IP calls. On the other hand, the users are charged for IP calls toward the PSTN, including mobile and fixed networks. Therefore, the charging mechanism will still be required for VoIP services.

A VoIP Network Architecture

Figure 1 below illustrates the network architecture of a Session Initiation Protocol (SIP)- based commercial VoIP system. This VoIP system consists of the following components:

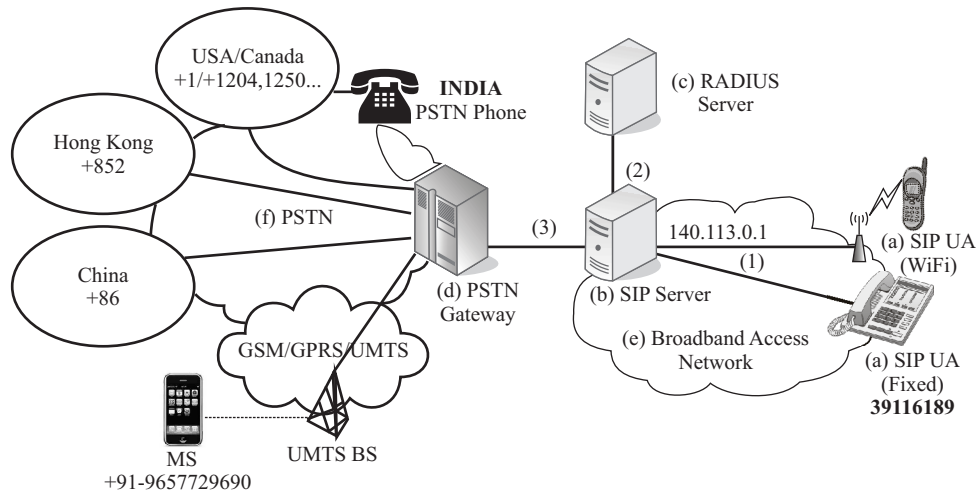


Figure 1 VoIP network architecture

- A SIP User Agent can be a software-based VoIP phone (e.g., Windows Messenger UA in Figure 2 or hardware based VoIP phone e.g., illustrated in Figure 3).
- The SIP server, which provides SIP registrar and proxy functions, can support 50,000 subscribers with 500 concurrent Real-time Transport Protocol (RTP) connections.
- The Remote Authentication Dial-In User Service (RADIUS) server provides Authentication, Authorization and Accounting (AAA) for VoIP users. Call related information such as Call Holding Time (CHT) is maintained in the database of this server.
- The PSTN Gateway provides VoIPPSTN interworking between the broadband access network and the PSTN. The PSTN gateway is typically a high capacity router with several E1 interfaces. Each interface supports 30 concurrent calls.

The SIP server, the RADIUS server and the PSTN gateway are located at the VoIP center. The SIP UAs connect to the SIP server through the broadband access network connections provided by domestic Internet Service Providers (ISPs). The total bandwidth between the VoIP center and other domestic ISPs will be few Gbps. The SIP server connects to the RADIUS server and the PSTN gateway through 100Mbps Ethernet lines. With SIP registration function, this VoIP system supports Nomadic VoIP service. That is, the subscribers can move to any place in the world, and directly attach to the SIP phone device for VoIP service through the Internet connectivity.



Figure 2 VoIP Softphone



Figure 3- Hardware based VoIP phone

Call Detail Record Generation

For the VoIP system, the CDR information is collected by using the RADIUS protocol. The SIP server acts as a RADIUS client that interacts with the RADIUS server to create a CDR for each VoIP call. A VoIP CDR typically includes the following parameters:

- The `radacctid` parameter specifies a unique record identifier (e.g., 10243), which is automatically generated by the RADIUS server.
- The `username` parameter specifies the calling party (e.g., 39116189).
- The `nasipaddress` parameter indicates the IP address of the node that requests authentication (i.e., 140.113.0.1 for the SIP server).
- The `acctstarttime` and the `acctstoptime` parameters (e.g., 2010-01-22 09:01:32 and 2010-01-22 09:02:44, respectively) store the start time and the stop time of the call.
- The `acctsessiontime` parameter stores the call holding time (e.g., 00:01:12).
- The `calledstationid` and the `callingstationid` parameters record the telephone numbers of the called party (e.g., 91-9657729690 for a mobile phone number in India; and the calling party (i.e. 39116189), respectively).
- The `acctterminatecause` parameter indicates the reason why the VoIP call is terminated (e.g., User-Request).

Figure 4 illustrates the call setup and call release procedures where the calling party is a VoIP user and the called party is a mobile user. In the broadband access

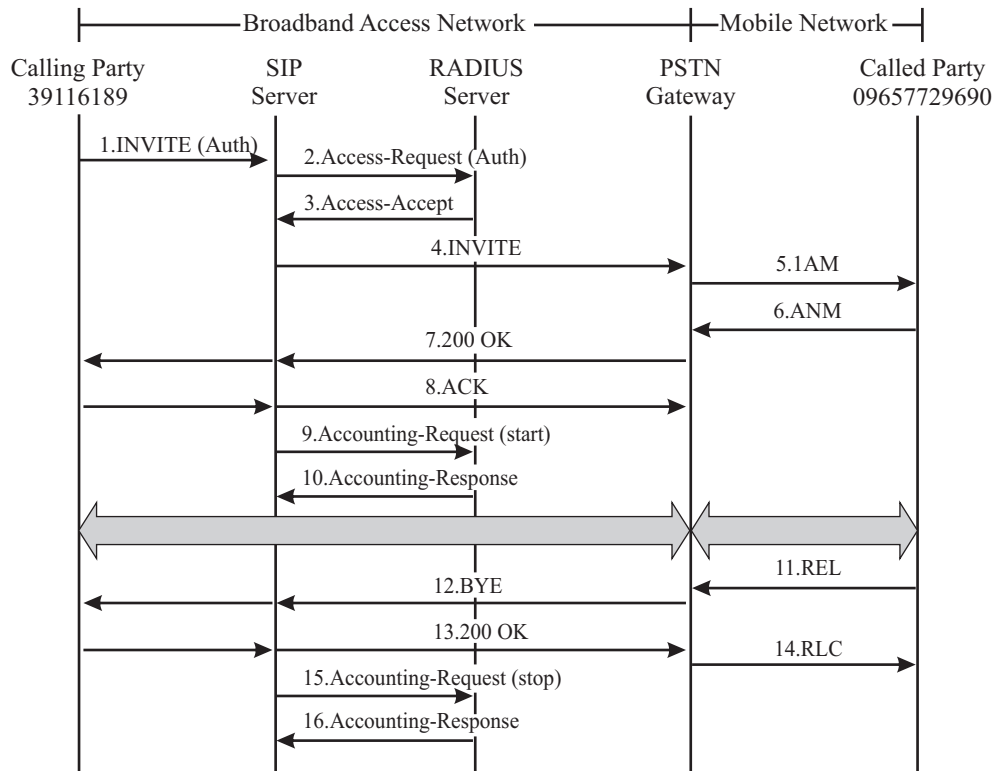


Figure 4: Message Flow for Call Setup & Call Release from Broadband Access Network to Mobile Network

Network, call control is achieved by using SIP. On the other hand, the PSTN/mobile uses SS7 for call control. The PSTN gateway is responsible for protocol translation between SIP and SS7. The calling party dials the local GSM number 9657729690 (or alternatively, +91-9657729690).

Step 1. The calling party sends an INVITE message to the SIP server. This message includes a Request-URI header field designating to the called party, a From header field indicates the calling party (39116189), a To header field indicates the mobile called party (91-9657729690) and several authentication parameters (e.g., username, realm and nonce).

Step 2. Upon receipt of the INVITE message, the SIP server acts as a RADIUS client and sends an Access-Request message to the RADIUS server. The Access-Request message contains the authentication parameters.

Step 3. The RADIUS server retrieves the user's record from its database by using the authentication parameters. If the authentication is successful, it replies with an Access-Accept message to the SIP server for authorizing the SIP request. At this point, the username parameter is confirmed and will be filled in the CDR at Step 10.

Step 4. Upon receipt of the Access-Accept message, the SIP server checks the Request-URI. Since 9657729690 is a mobile phone number, the SIP server forwards the INVITE message to the PSTN gateway.

Step 5. The PSTN gateway translates the INVITE message into an SS7 Initial Address Message (IAM) and sends it to the PSTN.

Step 6. After the called party has picked up the call, the PSTN replies with an Answer Message (ANM) to the PSTN gateway.

Step 7. The PSTN gateway translates this SS7 message into a SIP final response message 200 OK. This message is routed to the calling party following the reversed path of the INVITE message. That is, this message is sent to the SIP server and then forwarded to the calling party.

Step 8. The calling party replies with an ACK message to the PSTN gateway to confirm the receipt of the 200 OK message. The ACK message is sent to the PSTN gateway through the SIP server.

Step 9. Upon receipt of the ACK message, the SIP server sends an Accounting-Request message with status "start" to the RADIUS server to create a new CDR for this mobile VoIP call. This Accounting-Request message includes the username (39116189), the nasipaddress (140.113.0.1), the acctstarttime (2010-01-22 09:01:32), the calledstationid (91-9657729690) and the calling stationid (39116189) parameters. In the created CDR, the username parameter is filled at Step 3, the nasipaddress parameter is the IP address of the SIP server, the acctstarttime parameter is retrieved from the local timer and the calling stationid parameter is retrieved from the from header field of the Accounting-Request message. The calledstationid parameter is retrieved from the to header field of the message and is inserted a prefix 91 to indicate the call type.

Step 10. Upon receipt of the Accounting-Request message, the RADIUS server generates a new CDR in its database, fills the above parameters into the CDR and acknowledges the request message by using an Accounting-Response message containing the radacctid parameter (10243) to identify the CDR record.

Step 11. Suppose that the called party hangs up the call when the conversation is complete. The PSTN

sends the PSTN gateway a Release (REL) message to terminate the call.

Step 12. The PSTN gateway then generates a BYE message and sends it to the calling party through the SIP server.

Step 13. After the calling party has terminated the call, it sends a 200 OK message to the PSTN gateway through the SIP server. The 200 OK message indicates that the call is successfully terminated at the calling party.

Step 14. The PSTN gateway generates a Release Complete (RLC) message to the called party and releases the resources reserved for this call.

Step 15. Upon receipt of the 200 OK message, the SIP server issues an Accounting- Request message with status "stop" to the RADIUS server. This message includes the radacctid parameter (10243) received at Step 10, the acctstoptime parameter (2010-01-22 09:02:44) retrieved from the local timer and the acctterminatecause parameter (User-Request) that indicates the call is terminated by the user.

Step 16. The RADIUS server calculates the acctsessiontime parameter (00:01:12) and fills the parameters into the CDR (which is retrieved from the database based on the radacctid parameter). Finally, the RADIUS server replies with an Accounting-Response message to the SIP server. From the above description, it is clear that after call setup, all CDR parameters for this call are stored in the database of the RADIUS server. When the call is released, the CDR is considered closed, and will be used for the billing and other purposes.

Rating and Billing

Once CDRs have been collected, validated, normalised and consolidated, a charge is calculated for each call identified by the details in one or more CDRs. This process is known as rating and it is carried out by a rating engine. The rating engine can be part of a billing system or it can be a preliminary process outside of the billing system. In any event, the billing system will add up the charges determined during rating for each account, calculate balances and generate invoices. The CDRs then finally end up on the invoice in form of an itemised bill.

CDR mediation for Billing

CDR mediation is an intermediary process to billing which follows CDR collection. This is necessary to make sure calls are billed to the right entity and based on the right tariffs. CDR mediation consists of several processing steps. The following illustrates some of the necessary steps to prepare VoIP Call Details Records for billing.

Normalization:

Normalization is an important process that:

1. Cleans up the CDRs generated by switching equipment of unnecessary or inconsistent information or format the destinations based on a consistent numbering plan.

Caller Id normalization: A SIP caller Id "blue" <sip:9999560003@ag-projects.com;user=phone> is formatted to sip:9999600003@ag-projects.com which corresponds to a billable entity in Provider database.

Destination normalization: 0235468104@gateway.com for calls in the Netherlands might have the first 0 removed and 0031 appended. After normalization the destination becomes 0031235468104@gateway.com. 0031 has a corresponding rate which can be calculated based on a consolidated international destinations table (00 + Country code + Subscriber number)

Disconnection Code normalization: Example: Cisco release codes are stored in hexadecimal values corresponding to Q931 ISDN release codes defined by ITU.

Calls are categorized as **Local, Regional, National** or **International**. Regional and National minute buckets are defined at the service level and can be individually tweaked for each phone line. The system allows for late detection and rejection of local calls, if you discover they are leaking through.

Rating

A process by which each call is assigned a price based on a rating table. Rating may apply differently for PSTN related traffic than NGN related traffic.

PSTN Rating could be based on one or more of the following:

- Time of Day
- Day of the week
- Day of the year (holidays)
- Duration
- Destination (like country or mobile network code)
- Application type (audio, video, text)
- Network traffic

Telephony-wise calls have different tariffs depending on the time of the day (peak and of peak hours). The rating engine should be able to break the call duration into separate durations billed with the corresponding rate.

The rating architecture:

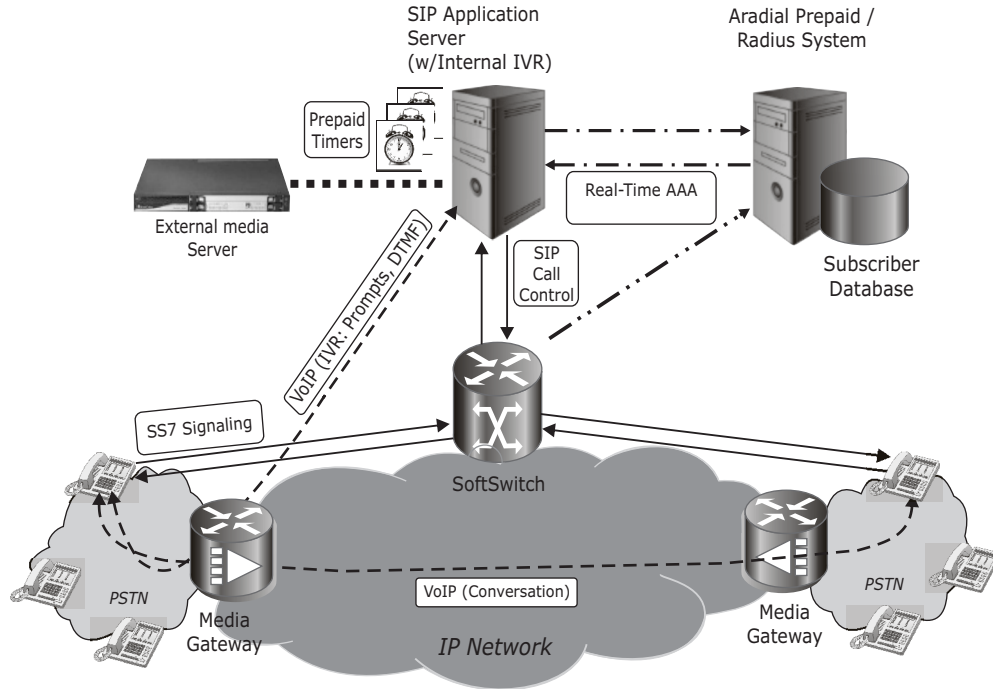


Figure 5: Rating Architecture

VoIP Billing Process:

Billing for VoIP services not only requires provisioning the service with a carrier/provider but also provision the service within the billing system. From VoIP service creation and classification to provisioning the service internally; importing CDRs from multiple sources and rating to billing and bill presentment (sending invoices to end customers); the Engage IP Billing VoIP system allows service providers to efficiently manage and accurately bill all aspects of end customer VoIP usage.

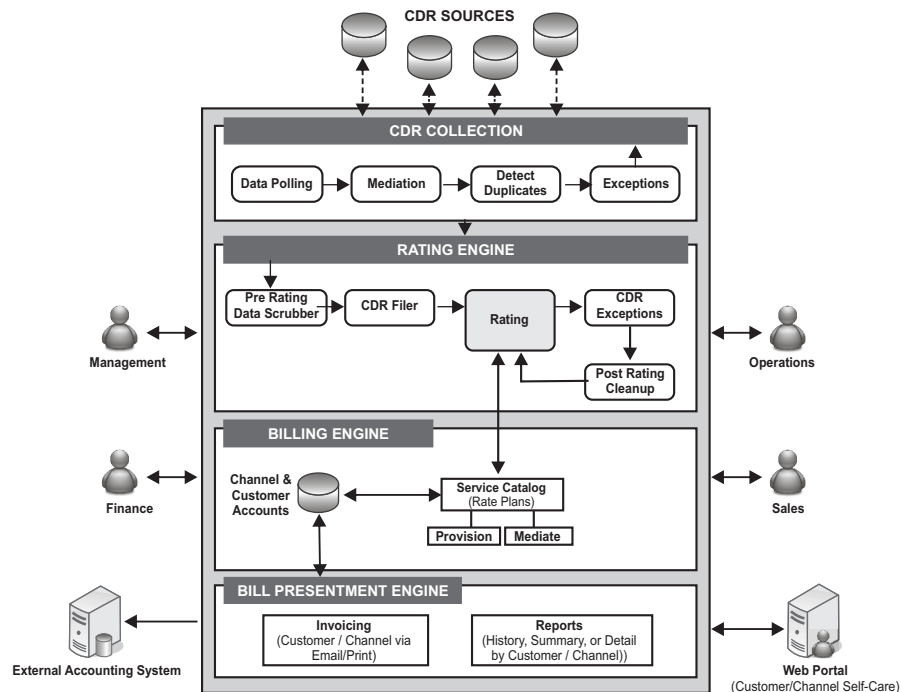


Figure 6: VoIP Billing Process

The billing engine at the end of billing cycle will summarize the usage amount, add recurring charges, run the adjustment process for credits and debits, apply the discounts if applicable and calculate the taxes. The ready billing data will then be forwarded to Bill presentation engine for formatting, creating print files of Invoices and sending email/SMS alerts to customers.

Conclusion:

Voice over IP (VoIP) is one of the most popular applications on Internet. This article has described the operation of VoIP service to illustrate VoIP Call Detail Record (CDR) generation, the process of mediation, rating, Billing and bill presentation for VOIP calls. Billing and mediation are important revenue-affecting pieces of any VoIP-based service. With so many VoIP protocols and small service providers and businesses launching VoIP, it is imperative that billing procedures are standardized and formats predecided prior to launch of service. The global growth of VoIP-based systems presents several challenges to the service provider with regard to data capture, processing, and billing. Mediation software plays a key role in VoIP networks. It accepts data from various network elements (for example, softswitches, media servers, signaling gateways, and service development platforms) and transforms it into industry standard billing data structures.

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An Overview of the Financial and Economic Impact of 3G Auction in India, on the Union Budget, Telecom operators and the Indian economy

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Abstract:

Recently, the government has received revenue of more than Rs. 1.06 lac crores through 3G/BWA spectrum auction. It has reduced its fiscal deficit for the current fiscal and is expecting the telecom industry to do the remaining good work of deploying 3G and providing innovative services to customers, increasing rural penetration to bring about economic and social development.

Deployment of 3G will no doubt be a tremendous boost to the growing Indian telecom sector. However, the going will not be so smooth. The telecom operators have paid huge amounts for the auction and have incurred or have to incur huge debts for funding the heavy investments for additional infrastructure. The tax incentives are a matter of controversy. The competition is severe, the pricing is under pressure, the ARPU is declining, the profits are uncertain and the cash flows are unpredictable.

The 3G auction has many implications for the future Union budget and government revenues, the telecom industry, the banking industry and the economy in general.

On this background, this article attempts to analyse the financial and economic impact of 3G licenses / auction on the Union budget, telecom operators and Indian economy. The article also takes a fresh look at different financial parameters to judge the effect of 3G auction on the financial viability and sustainability of telecom operators.

Background:

In the post liberalization era, Indian economy has witnessed tremendous and sustained growth. We have also witnessed growth of various industries in the economy especially in the service sector which includes IT, banking, telecom etc.

A few industries are still governed by licenses. Their business models and sustainability is, to a large extent, dependent upon the licenses issued to individual companies, and the applicable regulation. In some of the industries, the Government continues to have a stake. However, thanks to liberalization, the sector is also open to private players.

Telecom Sector in India:

The telecommunication sector is one such sector. The telecom operators in this industry have to survive in a world of licenses, auctions and regulations. Earlier, the telecom services were a monopoly of the central government. Post-liberalization, the same services can be offered by private players, in addition to government owned enterprises like BSNL and MTNL. Profit, naturally, is a major motive for private players. Due to liberalization, monopoly in the telecom sector is converted into oligopoly and the competition is tending towards near-perfect.

The telecom sector is growing. Due to wireless connections, there is a tremendous growth (CAGR) of 60% per annum since 2004. Due to this, Indian telecom has become the second largest telecom wireless network in the world. The share of the private sector in total telephone connections is increased to 82.3% in December 2009 (against 5% in December 1999). Teledensity as one of the parameters has also increased tremendously, which till December 2009, is 110.7% for urban areas, whereas for rural areas it is 21.2%. The total telephone subscriber base has reached 723.28 million, wireless subscription was 687.71 million, and teledensity 60.99% by September 2010. India is the second largest market in terms of subscribers (as of today more than 70 crore). Government has allowed FDI up to 74% compared to 49% earlier.

The telecom operators offer various services to customers in accordance with the licenses and spectrum obtained from Government. In the recent past, issue of 3G licenses has earned huge amount of revenue to Government through auctions.

Further growth in this sector can be achieved through deployment of 3G. There is a lot of scope for private players in rural areas to be supplemented by further benefits from metro circles by introducing newer technologies and value added services. This growth is expected to be driven, amongst others, by Mobile Number Portability, newer areas of value added services, manufacture of telecom equipment, infrastructure for deployment of 3G, handsets for 3G, and related services.

The Government has recently auctioned the 3G/BWA spectrum. The bid prices of auction for 3G spectrum and BWA were collected separately. The licenses may be distributed either by way of 'Beauty contest' method or 'Auction'. In India second method was adopted however, this may result into a 'Winning Curse' for telecom operators.

In this article, detailed analysis of the same is carried out based on its effect on Union budget, Telecom Operators, handset manufacturers, customers and on other industries like banking etc.

The major concern here is that, even though all figures mentioned above indicate growth in terms of numbers (including revenues of telecom operators), some other figures like ARPU, profits and profitability are decreasing. Finally, some suggestive measures on this situation are also explored in this article.

Indian Economy:

The growth rate in GDP in 2008-2009 was 6.7% & expected growth rate for 2010-2011 is 9%. India's fiscal deficit increased from 2007-2008 and it was 6.8% (budget estimate) of GDP in 2009-2010. The fiscal deficit was estimated to be 5.5% of GDP which works out to be Rs. 3,81,408 crores with Government borrowings of Rs. 3,45,010 crores. The expected GDP growth rate is 9% and is moving towards double digit. The estimated budget deficit for 2011-2012 is 4.8%.

The impact of 3G auction is considered on this background.

3G & Indian Economy:

The Government has tried to resolve both the issues: how to stabilise and accelerate the growth rate, and how to control the fiscal deficit, through huge collection of revenues by auctioning of 3G licenses to telecom operators.

Both the auctions for 3G and BWA were highly successful in terms of revenue to Government. (As against the expectation of a total Rs. 35,000 crores, the government earned Rs 1.06 lakh crores through this auction). This amount may seem 'high' in relation to the expectations, but for a 20-year license, one has to correlate it with the estimated sector revenues over that period. Also, the government earning from 3G and BWA spectrum works out to around \$20 per capita (population estimated at 1.17 billion) and that is much lower than \$600 per capita realised from similar auctions by the UK and Germany way back in 2000.

The overall effect on Indian Economy is as under;

1. Reduction in fiscal deficit:

- Fiscal deficit arises when a Government's total expenditure exceeds the revenue that it generates. India has been facing a fiscal deficit for a long time. Every year the Government has a target to reduce the deficit. Any such deficit indicates governments borrowing programme.
- The revenue collected through 3G auction is treated as Revenue in Government budget it is non tax revenue (which is actually a onetime rather than a regular source of revenue) which will reduce the deficit for current year.
- The amount received (more than Rs. 1.06 crore) will not be shared with state Governments.
- Rs. 1.06 lac crore is estimated to be 15% of revenue receipts of 2010-2011 and 24% of fiscal deficit.
- Even though it is an advantage, it is only for the current year. For subsequent years the Government has to focus on reducing the expenditure.

2. Lesser borrowings:

- The fiscal deficit can be reduced either by increasing the revenue in terms of taxation or by reducing the expenditure. Otherwise the deficit has to be financed by borrowings.

- In the current year due to the huge amount collected through auction, the Government will have to borrow less. In the short term it is an advantage.
- The borrowing by Government for FY 2011 will come down by Rs.1.06 lacs crores as against expected borrowings of Rs. 4.57 lacs crore in 2010-2011. Out of this the net borrowing for FY 2011 would be Rs. 3.45 lac crore. Thus spectrum auction has definitely helped Government to reduce its borrowings in the current year. (Montek Sing Ahluwalia - 3G auction revenue to help Government cut borrowings May 21st, 2010 Forum 4 Finance)

3. Boost to GDP growth:

- The huge collection through the auction will enable much more government spending on telecom infrastructure development in rural areas, help the Government to return to fiscal consolidation, and propel GDP growth.
- It is now an established fact that increase in subscriber base in telecom leads to increase in GDP rate. Assuming improved penetration of telecommunication services including in rural areas, it is expected that GDP growth will get an overall boost in the next few years. As per an UN study, it has been estimated that a 10% rise in mobile penetration increases GDP by 1.2%
- According to a U.N. Study, mobile phones can improve livelihood of poorest people in developing countries. According to this report, penetration in developed countries is more than 100 whereas in developing countries it is much lesser. Hence penetration of this sector will help Indian economy grow faster.

4. Positive effect on inflation:

The amount so collected is huge as compared to the fiscal deficit (i.e. almost 25%). The reduction of deficit should help in reducing the inflation in the economy to some extent. (However, further detailed study is required to see the nature of impact on inflation.)

5. Technology and infrastructure development to boost the economy:

- The newer technologies along with increase in telecom infrastructure will give a boost to the telecom sector.
- The boost in one industry / sector also helps other sectors to grow e.g. due to 3G, more infrastructure is required, more investments are required which will help other industries like IT, banking, media etc. to grow. The indirect benefits to these industries will boost the economy and GDP further.

6. Consolidation of foreign exchange reserves:

- Due to 3G deployment, the FDI in this sector is also expected to grow which will substantially increase the foreign exchange inflows. The cumulative FDI in the sector pegged at Rs. 33,957 crores.
- As the limit is already increased from 49% to 74% there is a possibility of more investment in this sector.

- For 3G deployment, ECB is expected to be the main source of foreign funding.
- The Telecom Industry generates nearly 43 billion US worth revenues for the exchequer.

7. Difficulties ahead:

- The amount collected by Government through spectrum allocation will reduce budget deficit to 4.47% of GDP against an estimated deficit of 5.5% however only for current fiscal year.
- The fiscal deficit and borrowings have come down in the current year but may go up in future. In the current year Government could manage the budget deficit due to 3G auction however in coming years there would not be such auction and inflows hence next years may be difficult to manage the deficit.

3G & Revenue to Government :

• One Time Gain.

It is a receipt to Government account. The actual collection is much more than expected. The following table shows the amount realised by Government against its expectation.

Particulars	Budgeted (Rs.)	Actual (Rs.)
3 G Spectrum Auction	35000 crore	67719 crore
BWA Spectrum		38617 crores
Overall	35000 crore	106336 crores

Table 1: 3 G Spectrum Auction-Budgeted Vs Actual (Rediff Business 11/06/2010 figures)

- The most important aspect will be how funds raised by the Government through this mode will be utilized in the economy. (Whether it will be used in public schemes or supporting administrative cost of Government is required to be observed.)
- In opinion of the authors instead of one time collection (gain) of amount in terms of auction, the Government should have collected the amount as a percentage of revenue per operator over a period of 20 years or by way of taxation, which would have given continuous and consistent revenue to the Government without undue burden on telecom operators to invest money for auction, coupled with no pressure on banks' balance sheets.
- **Taxation.**

The Government has gained a big receipt through this auction instead of generating consistent annual revenue streams in the coming years by way of taxation. The normal way to boost revenue is through increase in taxation. However if the Government were to collect such a huge amount through taxation,

then it would involve administrative cost and a long time, always with the possibility of disputes in levying and collection. Moreover, changing taxation policy on yearly basis may be difficult considering the imminent arrival of DTC.

The collection of Rs. 1.06 lac crores through the auction had lesser collection cost (as compared to tax collection of an equal amount), since it is received as “other communication services” in the budget as a non tax revenue.

Income Tax Relief:

One has also to consider the analysis from tax point of view. Collection of taxes is a major revenue source for the Government. In income tax there are some specific incentives to Telecom Operators. Telecom operators get income tax benefits for amounts spent towards obtaining license to operate telecommunication services.

This benefit is covered under section 35 ABB where the amount is deductible over a period of time; whereas for other infrastructure investment the operators will get depreciation benefits. However, section 35ABB is not free from controversies.

Upfront fees paid to acquire license and spectrum should be deductible expenditure over the license period which will help operators to gain tax advantage. Fair incentives and clear provisions can reduce litigation. Less tax means better cash flows for the telecom industry, which will make the telecom industry stronger in the long run.

Payment of MAT (Minimum Alternate Tax):

The telecom operators may incur losses due to various reasons such as amortization of licenses, depreciation on additional infrastructure costs, interest burden and other related costs incidental to obtaining the licenses, etc. All these expenses are charged against revenue resulting into reduction of accounting profits. Normally, in such cases, if there were no MAT, they would not be paying any income tax. However the payment of income tax under MAT provisions will depend upon individual telecom operator's “book profits”.

Dividend Distribution Tax:

DDT is also a major contributor to Government exchequer. DDT collected in 2008-2009 by Government in total was Rs. 10981 crores.

Since telecom operators are likely to suffer from accounting losses due to various reasons mentioned above, possibility of payment of dividend to shareholders in the near future is remote. (i. e. until they earn profits) The inability of operators to pay dividend will result into the loss of DDT revenue for the Government. However detailed analysis would be required to estimate the amount of loss of revenue to the Government due to above reasons.

Income Tax Benefit u/s 80IA:

At present those telecom operators who have started operations before 31.03.2005 are allowed 100% deduction u/s 80IA for ten consecutive years. In the past the revenue foregone by Government due to this benefit was estimated to be Rs. 4360 Crore in 2009-2010.

Some of the present operators may not get this benefit for ten full years (beyond 2015) in respect of 3G licenses. Further, as per the present provision, operators commencing operations on or after 01.04.2005 may be deprived of this deduction. If the benefit is not available post 3G, it may affect their Profit after tax and financial viability.

Excise and Service Tax:

The newer telecom technologies (3G) would lead to newer services being offered to existing or newer subscribers which is likely to increase total revenue of telecom operators. As per existing rules, these services are subject to service tax. So in the long run the service tax collection is also likely to increase which will increase Government revenue and reduce fiscal deficit for subsequent years.

The total service tax collected by the Government in 2008-2009 was Rs. 60941 crores out of which an estimated contribution of telecom operators was Rs. 6800 crores.(Almost 10%) considering this proportion, post 3G the Government revenue can also be expected to rise. Subsequently it is estimated that telecom services contributes to around 30% to India's total service tax revenue.

Telecom operators will also claim CENVAT credit (since they have to spend huge amount on other investments) to lower their tax incidence. This will reduce the indirect tax collection, the effect of which needs to be carefully assessed.

VAT:

Since to avail 3G services, the handsets have to be compatible, the demand for these handsets will increase. The sale of the handsets will benefit Government in terms of collection of Value Added Tax (VAT).

Security Transaction Tax:

Due to poor performance of telecom operators' stock prices on BSE/NSE, if turnover of shares decreases (investors hold it for long period of time instead of frequent trading) then Government may lose securities transaction tax and due to long term holding capital gain tax collection on this account will be nil as per current taxation norms.

Other Levies by Government:

The telecom operators pay 6-10% of their annual revenue as license fees, 3-8% as spectrum usage charges apart from 12% of service tax on their revenues. Post 3G if these operators revenue increases, then above charges which are based on revenues will also increase.

3G - Effect on Other Sectors

- Post 3G auction the RBI bought back Rs 10,000-crore securities to inject liquidity. The move is aimed at injecting liquidity into the system at a time when money has moved out of banks on account of telecom companies having borrowed around Rs 45,000 crore to pay for 3G licences.
- One way to look at this auction is that This huge collection will help the Government to reduce the borrowings from banks. More funds will now be available for other industries which will help to reduce the interest rates and boost the economy. However in reality the Government borrowing has been shifted from Government to Telecom operators with banks as intermediaries i.e. suppliers of funds in economy.
- If one considers the possibility of banks' lending the entire amount to telecom operators then it may adversely affect banks' balance sheets and NPA positions.
- Banks and their shareholders will have to bear this burden for a long period of time as compared to other stakeholders whereas other stakeholders may gain in the short run.
- Other incidental industries will also grow. These include mobile device manufacturers, hosting, billing and network management services, security management services, content providers etc.

3G effect on Telecom Operators:

- **Investment Decision:** The telecom operators have spent more than Rs. 1,00,000 crores in obtaining the 3G licenses from Government. Further, they have to invest huge amounts in building infrastructure for offering these services.

It is expected that the operators will have to further spend a lot of money towards network security related issues. Such direct investment (Cap-ex) will be supplemented with other heavy capital expenditure on other incidental accounts to run overall business.

- **Financing Decision:** The above investment requires huge resources. The telecom operators do not have such huge internal accruals hence they have to rely on borrowed funds. The operators may raise the funds through banks i.e. Nationalised Banks and other banks. It is estimated that such lending of Rs. 67000 crores equates to 1.8% of total banking sector credit outsourcing.

Another option with operators is to raise the funds through ECBs and then repay bank loans raised as discussed in above para. Considering recession in foreign countries and likely financial under-performance of telecom operators this is going to be difficult. Moreover the norms for ECBs are stricter hence raising the funds through this mode may not be easy. However, ECBs are cheaper than bank borrowings. In such cases, companies can save interest cost.

- **Capital Structure:** It will result into increasing debt levels in their balance sheets. The debt equity ratio is also affected which will be worse than earlier. Replacing bank loans with ECBs is a good option however interest cost will still erode part of profits earned by telecom operators.

Different telecom operators will have different capital structures and borrowing from banks will affect the companies in different ways. One can rely on Debt / EBITDA ratios to study strain on

individual operator's balance sheet position. (Debt service coverage ratio). Heavy debt burden may further lead to poor credit rating of these companies.

- **Revenue for operators:** Since the operators have invested huge amount, they will have to recover it from customers by charging higher prices initially. However higher prices may affect their revenues. Introduction of MNP and severe competition will further make estimate of revenue uncertain.
- **Expenditure for Operators:** Due to 3G services, the operators' operating expenditure (including marketing, selling, amortization, depreciation and interest cost) and operating revenues for relevant period may initially show a mismatch. However after break even period (which is also uncertain) companies may reap return on investments.
- **Profits & Profitability:** Thus there is going to be heavy burden on operators' profits and profitability. In the short run it may suppress companies EPS and market prices of share also with a possibility of no returns to shareholders.
- **Effect on Cash flows:** For 3G auction, the route of money flow will be the banks that will provide funds to telecom operators, telecom operators to pay these funds to Government towards licenses, which will help to offset fiscal deficit by 1%. The reduction in deficit may help Government in different ways.

On the other hand, telecom operators will have to generate sufficient cash flows to repay these loans. Until they have been repaid and the company earns profits, shareholders will have to carry the risk. Heavy initial investments, large recurring expenditure, uncertain revenue and repayment obligations along with no specific tax incentives will create pressure on cash flows for operators.

- **Effect on Stock performance and Valuation:** Since the operators are listed on stock exchanges in India, above expected financial position may have adverse impact on stock valuation and market capitalization. In a few other countries like UK and Germany, the performance of a few top winners in 3G auctions in their respective countries, it is observed that share prices trumbled after they win the licenses.
- **Winning Curse:** When the bidders who overestimate the value, end up paying much more than the true value of the object, it is called as 'The Winning Curse'. The huge outlay has resulted into 'winning curse' to telecom operators. Since most of the telecom operators have won circle wise licenses it is required to analyse whether operators have overpaid or underpaid by using a game theoretic measure of a company's value known as the Shapley Value. The issues that operators might have to face are summarized as under:
 - Huge investments i.e. cap-ex for spectrum 3G auction, deployment of 3G cap-ex (e.g.: Vodafone is estimated to spend over Rs.23000 crores for 3G cap-ex and security investments) Likewise other operators need to invest for 3G.
 - Huge bank borrowings / ECBs to finance above capital expenditure.
 - Increase in interest burden in income statement lowering the earnings. (EBT)
 - Adverse debt equity ratio, debt to asset ratio, return to asset ratio, EBDITA/ debt ratio.
 - Adverse effect on cash flows i.e. strain on operators' cash flows to generate sufficient operating

- cash flows to support financing activity outflows
- Uncertainty in revenues due to competition and MNP, delay in 3 G launching
 - Lowering of ARPU even though with 3G it is likely to increase.
 - Adverse Balance sheet financial position
 - Negative impact on stock prices and market capitalization
 - No special income tax benefits / relief on 3G investments.
 - Break even period is still uncertain since pricing 3G services will be a major issue which is expected to be not less than 5-6 years. Most of the operators have not yet confirmed their BEP in case of 3G investments
 - Facing social issues - Environmental effect on Health i.e. impact due to radiation electromagnetic waves,
 - Prices charged to customers will be high so demand for 3G services is required to be assessed.
 - 3G usage illiteracy and cost effect of switch over from 2G to 3G
 - Further moving from 3G to 3.5G and so on with coming technologies and adapting to them.

Considering the above situation, financial performance parameters for telecom operators to evaluate license BEP, ROI, EVA, market capitalization, return to shareholders may be adverse in the initial period after launch of 3G services. However depending upon financial strength of individual operators and the strategies, it may improve at a later stage.

Advantage to the operators:

- The telecom operators are trying to take the long term benefit to improve their ARPU and profit margins by offering 3G services to its customers.
- Further analysis of bagging of circles by telecom operators and related price paid by them can be done to evaluate each operator's financial performance in the coming years. Its valuation aspect can also be analysed.
- In the long run, the auction will possibly lead to a situation in which the valuation of some of the telecom operator companies may be quite high as compared to the others, in case mergers / acquisitions take place.
- The valuation metric used all over the world for comparing 3G licenses is 'price per capita / 2x5 MHz'¹.

¹Economic Times dated 3-11-2010

3G & Customers / Subscribers:

- Customers will get varied services due to 3G like high speed data, video , more information, faster data access, multimedia services, robust internet facility, use of e-commerce, social networking and telemedicine, video & music download etc.
- The availability of spectrum will help customers to get new services in the form of TV on mobile, games, music, improved voice quality and reduction in call drops or improvement in existing services along with access to desired information on web. However for this, customers will have to spend extra for handsets which are 3G enabled which will boost this industry.
- The customers will have to pay higher prices for these services in the initial period. Due to heavy prices paid by telecom operators for spectrum, the prices to be charged to customers will be more.
- The practical utility (value addition) of 3G will be for stock transaction, e-learning, telemedicine through wireless communication and other services.
- These services will definitely help customers in various ways, however, at a certain cost. Prima facie, it will definitely add overall value for personal as well as commercial use.

3G & International Scenario

- UK Government raised \$35 billion through 3G spectrum option and Germany raised \$46 billion. However post auction, companies witnessed huge pressure on their debt levels and subsequently lowered their stock performance.
- In USA, auction was once re-run however in March, 2008 it raised US \$ 19 billion. In other countries like in Europe most of the countries have collected huge amounts. The 3G auction could fetch windfall gain to Governments of the respective countries (UK collected 22.5 billion (GBP) and Germany collected 30 billion (GBP). However it was later observed that it had created negative impact on other aspects of the economy. Telecom companies in those countries had adverse debt to asset ratio, adverse effect on credit rating of these companies, earlier generation network and infrastructure was difficult to maintain due to cash constraint. For Governments in those countries such windfall gain was offset by reduction in income tax / corporation tax in long run. (i.e. one time gain in place of future revenues)²
- In Japan and South Korea spectrum licensing fees were not charged since these countries had an objective of developing the IT infrastructure in those countries.

The way ahead: Some Suggestions

Tax incentives May be Streamlined:

- The spectrum charges paid by telecom operators (Rs. 67719 crores) is a huge amount. The license is of 20 years. One of the income tax benefits which can be given to telecom operators is to allow it as a capital expenditure and then allow it as tax deductible expenditure in next 20 years spread evenly. It

will help the companies to save tax for the next few years and result into increase in cash flows.

- Such a provision is contained in Section 35ABB of The Income Tax Act but is not free from controversies. In the past Government has not allowed this deduction for license under 2G spectrum².
- The Government should extend the benefit under Section 80IA of the Income Tax Act. As per the present provision, it will not be available beyond 2015.
- The Government may extend tax incentives for infrastructure of telecom operators in rural areas.
- One of the possibilities is that due to high pricing attached to 3 G Spectrum it is now felt that the prices to be charged to customers for availing 3G services will be on the higher side. In these cases, if prices charged are higher then the billable amount to customers will be higher and thus service tax incidence on this will also be higher which will ultimately benefit the Government. Since the Government has already collected huge amount upfront, it can think of partially exempting or giving some relief in charging service tax on such services for first few years. It will help operators and customers since exemption from this tax will reduce overall pricing to customers.

Incentives for rural penetration / social use:

According to U.N. report mobile penetration (coupled with ICT) helps in poverty alleviation and overall economic growth. Considering this aspect, certain incentives may be granted to telecom operators based on penetration in rural areas / use of 3G services for social benefits. (Eg: M-Pesa in Kenya and Jigyasa in Bangladesh, Telemedicine, E- learning, agriculture and primary services etc.)

Raise funds through infrastructure bonds:

Allow to raise funds through infrastructure bonds at lower rates from customers at large with income tax benefits so that the debt burden on banks is partially reduced. Since the issue of cap-ex is of paramount importance for operators, one way is of funding the required rural telecom infrastructure by Indian Infrastructure Finance Company Ltd. Alternately,

Exploring possibilities of deregulation of mergers and acquisitions in telecom space

Conclusion:

3G and Inclusive Development:

The next generation in technology (2G is followed by 3G) is going to affect the society at large. The focus of this advanced technology should be towards social benefits. In this context 3G is expected to substantially increase rural telecom penetration, help e-governance initiatives, provide education to remote areas, create new employment and entrepreneurial opportunities, and thus, on the whole, to bring about poverty alleviation, economic growth, and inclusive development.

²Wikipedia-Telecoms Crash

³3G Winners to ask Cap-ex for 3G auction under income tax-Indian Express

For Telecom Operators: Boon or Curse?

On the one hand, the operators have obtained the license to deploy 3G. Yet, on the other, it is going to be very tough for them to ensure and sustain profitability in the long run.

The government has collected huge amounts of cash through the auction, which is bound to make the operators debt ridden. They will have to spend a lot more on infrastructure and other capital requirements, which may further increase the interest burden. The present tax incentives are either unclear or in dispute and may not provide any respite.

The industry has become highly competitive which has put the pricing under pressure, the ARPU in a decline, the profits in jeopardy and has made the cash flows unpredictable. These factors are going to affect the long term financial position of telecom operators. Some of the financially weak operators may even face bankruptcy.

Under these circumstances, “financial sustainability” looks like an unlikely prospect.

Need for Government Support:

Survival and financial sustainability of the providers of Telecom products and services is going to be a critical factor for economic and inclusive development. Strategically, contribution from operators is not going to be sufficient. It has to be supported by certain time bound Government incentives (as outlined above) for this industry and sector.

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Beyond 3G: Fourth Generation

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Abstract:

The mobile communication generations has traversed a long way through different phases of evolution since its birth early in the 1970s. Today numerous different generation technologies with their individual pros and cons are existing globally. The coming era of 4G systems is foreseeing a potential smooth merger of all these heterogeneous technologies with a natural progression to support seamless cost-effective high data rate global roaming, efficient personalized services, typical user-centric integrated service model, high QoS and overall stable system performance.

With the plethora of promising features 4G is truly moving towards getting universally accepted as the ideal next generation communication system. However, every step in such technological advancements presents huge research challenges. This paper aims to focus upon some of these potential challenges along with different developments in the areas of mobile and wireless access networks, and communication, in order to give an in depth view of the next-generation communication systems. It will also highlight upon the 4G business models and the solutions to implement 4G.

Threats of Industrial Espionage in IT & mitigation methods

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Abstract:

This paper describes the effects of Industrial espionage on organizations and the various Technical & Non-technical methods that could be used to mitigate them. A survey conducted in 1999 by PriceWaterhouseCooper and ASIS found that Fortune 100 companies had lost in excess of \$49 Billion directly related to the loss of intellectual property. Moreover, according to the U.S. National Counterintelligence Executive's 2005

Annual Report to Congress on Foreign Economic Collection and Industrial Espionage, a record number of countries 108 were involved in the collection of intelligence and trade secrets.

Case studies in the paper explain the ways or the mediums used to leak the data. The limitations of the organizations in protecting the data have been brought to the fore, thus leading to the establishment of the technical & non-technical methods to overcome the threat caused by espionage. The paper also deals with cyber espionage which involves infiltration into the system by using Spyware, Remote Access Tools (RAT), Hacker tools & other technologically conceived spying tools.

Project Financing In Telecom Sector

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Abstract:

Unlike the US, the Indian telecom industry with a CAGR of 14.3 % is still growing and slowly maturing. The Porter's Five Force analysis paints this sector with high rivalry, low entry barriers, price wars, high buyer bargaining power and a reasonable threat from substitutes. Telecom sector while bustling with the introduction of 3G and WiMax is still coming to terms with the necessary regulatory strictures.

This paper discusses how these events and processes infuse risks in the telecom sector and affects its financing. The regulatory risk has brought in sea changes in the strategies of telecom companies offering 3G and equipment companies like Research in Motion. The small telecom infrastructure players face high credit risk due to low capital expansion capacity as compared to the major players as shown by Indus Towers-BSNL and Reliance Infratel-GTL Infra. The innovative call rates and palette of value added services try to battle the financial and market risks. Fast changing consumer taste translates to technology risk for telecom equipment companies. The environmental risk poses a grave threat for the telecom equipment and infrastructure companies.

Despite the roadblocks, there are many successful businesses in this industry and project finance is one of their tools for risk mitigation. The paper studies these examples for a detailed understanding of need and implementation of project financing in telecom industry.

Facing regulatory, market and financial risk, Bharti Telecom fulfilled its ambition from overseas expansion with a debt of \$ 8.5 million through project finance to overtake Kuwait based Zain Telecom's African business.

In the telecom passive infrastructure industry, small independent tower companies are often restricted by shortage of capital. But GTL Infrastructure resorting to project finance for a loan of Rs 5000 crores, successfully acquired a profile of 17500 towers from Aircel.

Scaling Problem with Internet Routing Protocols and Solution

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Abstract:

In today's world with growth of billions of users for Internet, the network size is growing rapidly. As a result, the routing system present with the Internet currently is facing problems due its poor scaling properties. Shortest path routing which forms the base of present and traditional routing systems cannot help in restricting the size of routing tables on all network topologies. The expected growth rate for the routing tables is slower than the linear growth as function of increased network sizes. All of these led to the research of compact routing. It is a field of study exploring the limits for routing scalability. Compact routing also focuses on designing new algorithms to overcome the problem of scalability limits. Many compact routing schemes have been proposed in order to restrict the growth rate of routing tables to sub linear size, which have been proved analytically in different research papers. Till date the compact routing schemes have been designed for Internet, trees and grid like topologies which provides the size of routing tables to scale logarithmically with network size. Researchers have found that the logarithmic scaling is not possible with Internet like topologies because of two main reasons: (1) topology independent addressing (2) topology dynamics.

In this paper we will try to bring focus on the scalability problems present with the current routing systems, its causes and researches which have been carried on various compact routing schemes.

The Future Of Cloud Computing

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Abstract:

Though the concept of “clouds” is not new, it is undisputable that they have proven a major commercial success over recent years and will play a large part in the ICT domain over the next 10 years or more, as future systems will exploit the capabilities of managed services and resource provisioning further. Clouds are of particular commercial interest not only with the growing tendency to outsource IT so as to reduce management overhead and to extend existing, limited IT infrastructures, but even more importantly, they reduce the entrance barrier for new service providers to offer their respective capabilities to a wide market with a minimum of entry costs and infrastructure requirements in fact, the special capabilities of cloud infrastructures allow providers to experiment with novel service types whilst reducing the risk of wasting resources. Cloud systems are not to be misunderstood as just another form of resource provisioning infrastructure and in fact, as this paper will show, multiple opportunities arise from the principles for cloud infrastructures that will enable further types of applications, reduced development and provisioning time of different services.

Guidelines For Submission Of Papers/Articles

Manuscripts of the Papers: The format of the paper/article must be of **Font size 12, (Times New Roman)** in **double-space** (on one side of A4 paper in case of hard copy) with **margins of one inch on all sides**. Microsoft Word for windows is the preferred software for submission. Ideally the length of the paper/article should **not exceed 3000 words**, including tables, references, etc.

Paper/article should cover technical as well as business aspects of the telecom industry.

Cover Page: Paper should have a cover page providing the title of the paper, the name(s), address(es), phone, fax, email of all the author(s), and acknowledgement, if any.

Abstract: Following the cover page an abstract must be provided, containing summary of the paper not exceeding 200 words. The main text of the paper should start from the next page.

References: Proper and complete references should be given. At the end of the text, references should be listed in the alphabetical order of the last names of the authors, with a title “REFERENCES”. Websites that may have been referred to should be included under the same title.

Footnotes, figures, tables and graphs: These should be in standard format. They should be numbered serially and should appear at desirable places in the text itself, with proper reference made in the text. Wherever necessary, the source should be indicated at the bottom.

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About Research at SITM

Telecom Business Research Cell

Symbiosis Institute of Telecom Management formed the Telecom Business Research Cell (TBRC) in 2006 to promote and participate in applied research in Business & Technology .

The research done under the aegis of TBRC is based upon the contribution from eminent professionals, industry experts and faculty & students of SITM

The major research initiatives undertaken under TBRC are:

- **“Prevision”** SITM's Annual Telecom Forecast
- Faculty Research Projects
- Publication of the TBR Research Journal
- Exploring the possibilities of collaborating with the industry for research and consultancy activities.

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Symbiosis Institute of Telecom Management has constituted the Symbiosis Institute of Telecom Management Research Committee (SITMRC). The erstwhile TBRC has now come under its purview.

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