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Wireless Operator Mock RFP

A Guide for Mobile Wireless Operators In the Evolution to 2.5G and 3G Networks

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Introduction and Overview

The wireless industry as we know it is undergoing significant change. Progressive operators are in the midst of deploying early iterations of the next generation of networks that enable the delivery of advanced voice and data services. This is significantly expanding the potential for new and incremental revenues to help offset the current decrease in ARPU (Average Revenue Per User) most providers are experiencing. These new voice and data services will provide increased opportunities for differentiation, help expand subscriber loyalty and reduce the costly cycle of churn. Next generation networks require a thoughtful and strategic evolution from today's wireless network to 2.5G/3G networks and beyond to eventually all-IP based networks. Wireless operators will need to maintain a focus throughout their business on four key areas for this evolution to be successful—the integration of service and transport intelligence, increasing network flexibility, establishing granular visibility and control in order to monitor, meter and manage data services for profit, and fiscal responsibility.

- **Integration of service and transport intelligence**. Much like their brethren in the wireline world, many operators are highly engrossed in the process of increasing the data throughput of their wireless networks. However, this could lead to a repeat of the experience of the wireline carriers whose focus on "speed" led to commoditized access and differentiation from competitors on price rather than services. This could result in mobile operators losing a valuable opportunity based on their position at the center of the mobile services value chain and ultimately stagnated growth for the industry.

  User access speed is only part of the equation, and data services like SMS have proven that profit lies in the service as much as the speed at which it is delivered. The enablement of services will require a high level of integration between services and transport intelligence. It is not enough to just understand how fast packets are moving in the network, but operators will also need to understand which services are creating the packets and by which end-user. This information is necessary to provide the intelligence to maintain the network and correctly bill the subscriber. Service creation, delivery, provisioning, and billing processes must shift to order-of-magnitude improvements in terms of their speed and capability in the 2.5G/3G and all-IP worlds.

- **Increasing network flexibility**. It is not so much a question of discovering the killer mobile application, but more so, preventing the network from becoming an application killer. Establishing a truly open mobile service architecture that enables flexibility across platforms, systems, services, and applications will be a hallmark of the successful operator. Flexibility must occur in multiple dimensions to enable today's operator to evolve and adapt to the wireless market of tomorrow and beyond.

  New architectures must not only support 2.5 and 3G connectivity, they must meet the demands for the service flexibility required to apply new business, partnerships and revenue sharing models, while providing insight to subscriber data usage and market segmentation.

- **Granular visibility and control**. Subscribers will expect self-provisioning and instant access to new services and applications. This will increase the subscriber use of applications but will also pose challenges to the wireless operator. Operators will need a high level of visibility and control in their network to authenticate end-users,

provision the service and capture the detailed records for accurate billing. Revenue sharing for applications between the operator and third-party application developers will also require this visibility and control.

- **Fiscal responsibility**. Mobility itself is the key asset held by wireless operators. There is pressure for wireless operators to better maximize the inherent value of the network and their role in the value chain that must be leveraged to build stronger brand identities and profits. Wireless operators have the opportunity to avoid the mistakes of the wireline providers by not solely relying on transport opportunities, but instead also participating in the value creation delivered over the entire wireless network. Leveraging the value of the network will come on two fronts:

  1. A focus on new profitable revenue generation. Revenue from data services is moving from a small percentage of total operator revenue to a much larger percentage. It is critical that the services are not prematurely commoditized by time/volume-based charging options limited by legacy network infrastructure. There is some evidence that data services also stimulate an increase in voice usage by bringing new subscribers to the operator's network.

  2. A focus on reducing costs and managing to the bottom line. While always important, the challenges in 2001 and so far 2002 placed renewed focus on bottom-line financial returns. No longer are companies rewarded for growth alone, they must leverage the combination of existing and new infrastructure to increase ARPU and subscriber loyalty.

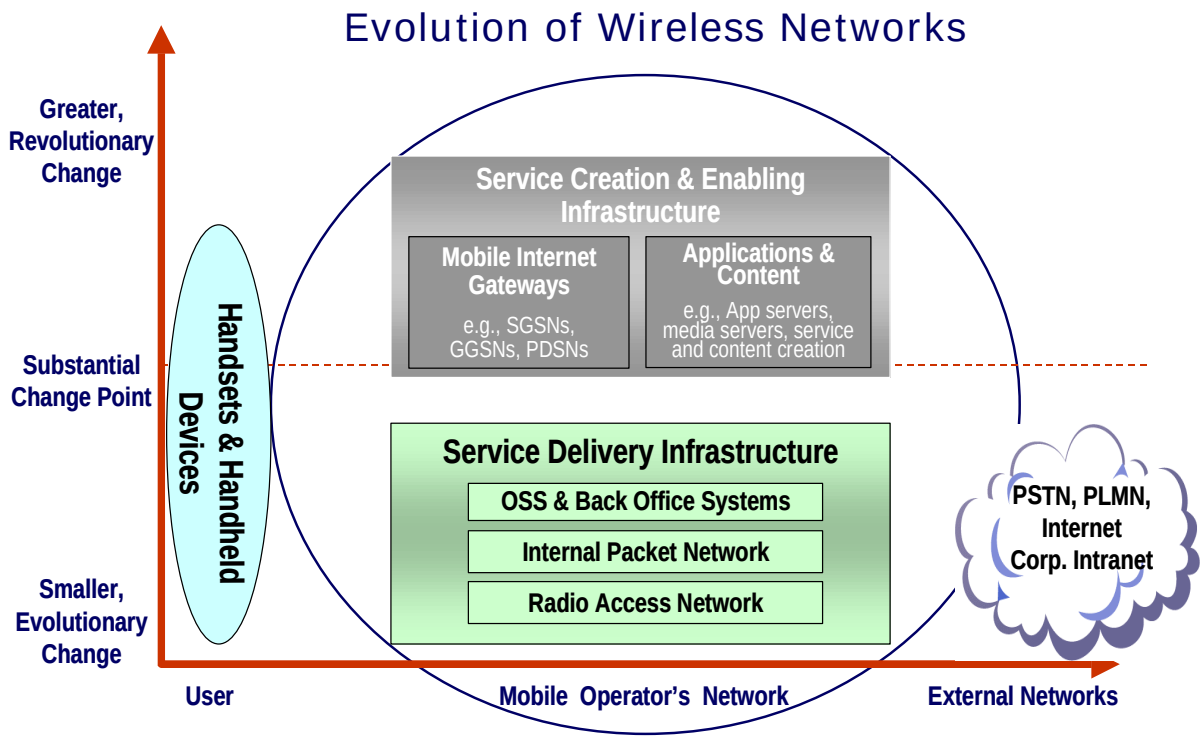
Purpose of this Mock RFP

Today's challenge is less about the technology itself and more about the ability to enable profitability through the capabilities of the technology. Operators tend to be more proficient in managing technology and less proficient at managing services. For instance, operators were proficient in the introduction and deployment of Intelligent Networks (IN) such as the SS7 network and equipment to profit from circuit-switched services such as the Short Messaging Service (SMS). The confluence of IN- and IP-based networks leaves many uncertainties with regards to how wireless operators will evolve their existing network to next generation networks. Some of these uncertainties include:

- How to create a network that is flexible and dynamic enough to anticipate and address the rapid, ongoing evolution of the wireless market.
- What level of intelligence is required in each of the network elements to enable operators to experiment with and profit from new services?
- How to accelerate the deployment of standards for real-time prepaid services in the most cost-effective manner possible.
- How to leverage the standards and focus on the technology required to support business and marketing needs.
- How will the change in network architecture impact the operator's business?
- Redefining capacity: How will the network scale against subscribers, sessions and services in an always-on environment?
- What end-user services will be successful?
- Which vendors are in a position to provide the essential components of the next-generation network?

To assist wireless operators in addressing some of these uncertainties, TeleChoice, in conjunction with several leading companies in the next-generation wireless ecosystem, have created this Mock RFP (Request For Proposal). The purpose of the document is to help operators ensure that the right RFP questions are being asked at the appropriate time in the network evolution. It does not attempt to be a comprehensive RFP addressing all components of the wireless infrastructure. Its focus is on the Service Creation and Enabling Infrastructure area of the wireless network and revenue and cost management systems of the OSS and back-office systems—all areas likely to undergo the most changes during the evolution process. (See Diagram 1 on the following page.)

Diagram 1



The move to 2.5G, 3G, and all-IP networks will require changes on many fronts. The information in the radio access network box is mostly known today. The greatest amount of change and potential will be in the service creation and enabling infrastructure within the wireless core, which is the primary focus of this document.

How to Use this Mock RFP

The intention of this document is to highlight the innovation that is necessary and possible outside the framework of a traditional RFP, which focuses primarily on what the standards demand. That is not to say that these innovations are not standards-compliant as they must be. It is more about focusing on what is required to leverage the standards in the most productive way to ensure profitable service creation and delivery while migrating to an all IP mobile network.

The document is composed of two major sections: "Service Enabling Architecture" and "Going Beyond Standard Drivers for Evolution." Service Enabling Architecture discusses the components that make up the next-generation networks and capabilities to look for. Going Beyond Standard Drivers for Evolution analyzes major drivers that operators need to be considering when planning their network buildout. Each section is composed of the following subsections:

1. Brief explanation of the section and why it is important.

2. Key questions – the main questions an operator will want to consider in its RFP. A brief explanation is also included to explain why the particular question is important.

3. Additional questions – in many cases a list of related questions are identified that may be relevant to an operator's scenario. These are questions that an operator should consider dependent upon the objectives of its RFP.

4. Red flags – identification of issues that an operator will want to remain cognizant of are located in various sections of the document.

Within Appendix A, an evaluation process called the TeleFilter is offered. This tool can be used to help wireless operators evaluate the RFP responses from multiple vendors.

Who Should Use this Mock RFP?

Wireless operators either migrating an existing wireless network to 2.5G/3G or building a 2.5G/3G network and planning to use the RFP method to determine the best vendor should use this mock RFP. It is ideal for operators not entirely familiar with the capabilities of the latest generation of infrastructure solutions for 2.5G/3G networks. This document is focused on exposing/exploring new revenue-generating services and billing models made possible by deploying best-of-breed solutions in the mobile wireless network. We assume that readers of this RFP are familiar with the relevant 3GPP and 3GPP2 standards. The target audience includes network architects and engineers, marketing and product management executives, chief technology officers, and others involved in network planning.

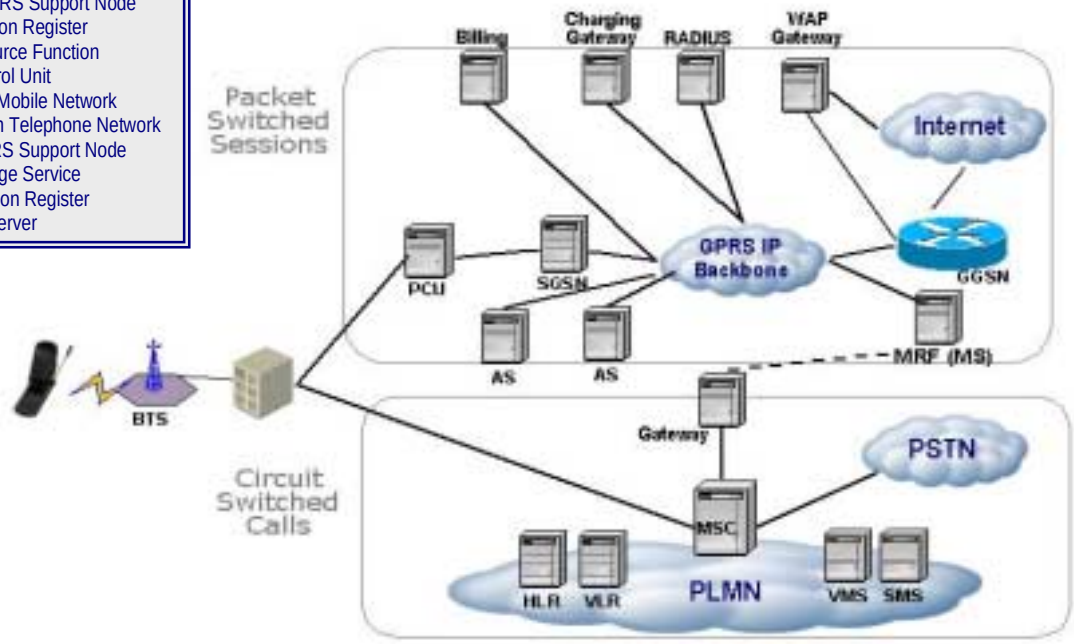
Service Enabling Architecture

The move to 2.5/3G and all-IP wireless networks introduces many new network elements required to deliver and support value-added IP services, third-party applications, strategic partnerships, and the new business models that will develop. This is true for both GSM- and CDMA-based networks. Most changes will take place in the mobile data core, which is the focus of the Service Enabling Architecture section rather than the Radio Access Network portion of a wireless operator's network.

Although equipment components differ between GSM and CDMA networks, many questions needed for successful network deployments remain the same and harmonization efforts are underway. Diagrams 2 and 3 depict a typical 2.5/3G network architecture at a high level. It is important to note that the 2.5/3G network is primarily a data overlay network to the existing wireless voice network. While there are some spectrum efficiency gains for voice, it is still circuit-switched during this stage of the evolution.

Diagram 2**

AS	Application Server
BTS	Base Transceiver Station
GGSN	Gateway GPRS Support Node
HLR	Home Location Register
MRF	Media Resource Function
PCU	Packet Control Unit
PLMN	Public Land Mobile Network
PSTN	Public Switch Telephone Network
SGSN	Serving GPRS Support Node
SMS	Short Message Service
VLR	Visitor Location Register
VMS	Voice Mail Server

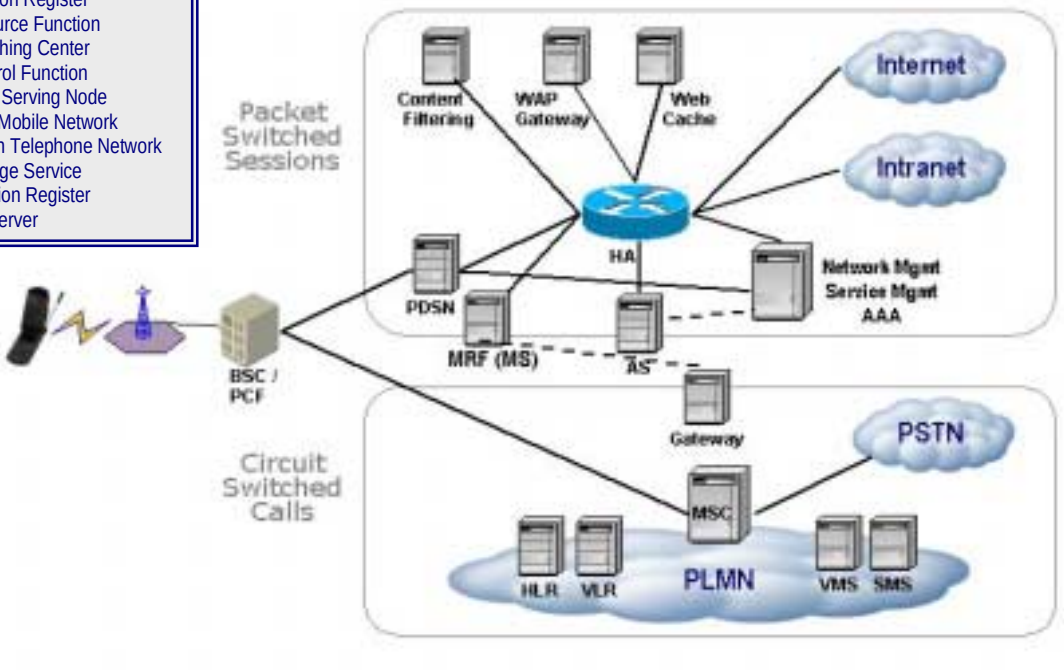


GSM-based 2.5/3G network illustration, referred to as a GPRS network architecture.

** The diagrams depict the GGSNs and HAs (Home Agents) with a traditional router-style icon for ease of understanding. Note that routing is only one aspect of the feature/function requirements of the hardware for profitable deployment of data services in next-generation networks.

AAA	Authentication, Authorization, & Accounting
AS	Application Server
BSC	Base Station Controller
HA	Home Agent
HLR	Home Location Register
MRF	Media Resource Function
MSC	Mobile Switching Center
PCF	Packet Control Function
PDSN	Packet Data Serving Node
PLMN	Public Land Mobile Network
PSTN	Public Switch Telephone Network
SMS	Short Message Service
VLR	Visitor Location Register
VMS	Voice Mail Server

Diagram 3



CDMA-based 2.5/3G network illustration, referred to as a 1X network architecture.

In Diagrams 2 and 3, the packet and circuit switched networks are bridged via a media gateway (see dotted line) and media resource function (also called a media server). This enables service providers to:

- Migrate legacy voice services
- Create compelling new services
- Create IP enhanced versions of legacy services with added features

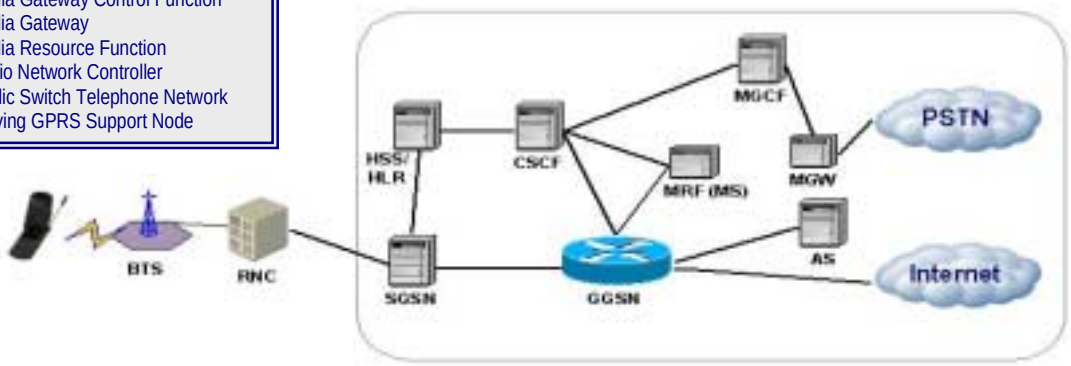
Service providers can thus make use of existing infrastructure while leveraging unique attributes of IP to increase revenue and differentiate from the competition.

Note that the terms "media server" (MS) and "media resource function" (MRF) are used interchangeably and mean the same thing. Media server is a more general term, while an MRF is wireless specific.

The move to an all-IP network may be some years away, but it is important to keep it in mind during the 2.5/3G network build-outs. Choosing a 2.5/3G equipment vendor with an evolution plan towards all-IP will save carriers time and capital when building the all-IP network. It is where both operators and end users will see the ultimate value of integrated voice and data wireless communications. The all-IP networks converge both voice and data into one network. Diagrams 4 and 5 depict the all-IP network components at a high level.

Diagram 4

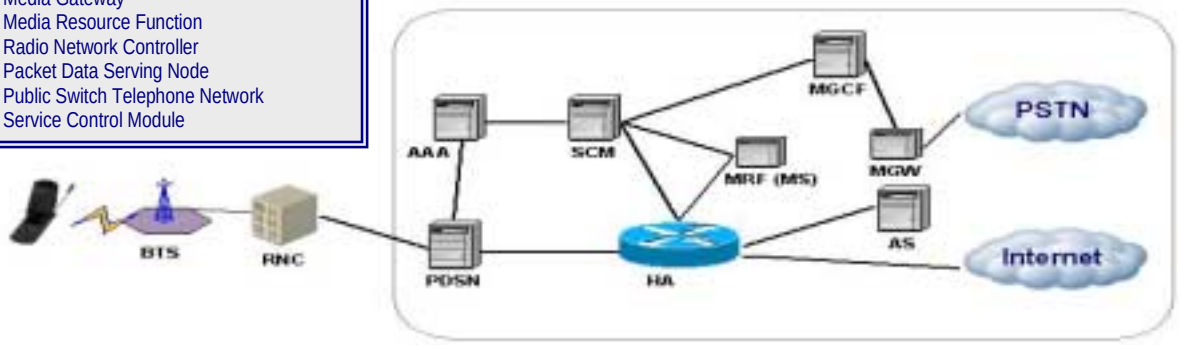
AS	Application Server
BTS	Base Transceiver Station
CSCF	Call State Control Function
GGSN	Gateway GPRS Support Node
HLR	Home Location Register
HSS	Home Subscriber Server
MGCF	Media Gateway Control Function
MGW	Media Gateway
MRF	Media Resource Function
RNC	Radio Network Controller
PSTN	Public Switch Telephone Network
SGSN	Serving GPRS Support Node



GSM-based all-IP network illustration, referred to as UMTS or WCDMA network architecture.

Diagram 5

AS	Application Server
AAA	Authentication, Authorization, & Accounting
BTS	Base Transceiver Station
HA	Home Agent
MGCF	Media Gateway Control Function
MGW	Media Gateway
MRF	Media Resource Function
RNC	Radio Network Controller
PDSN	Packet Data Serving Node
PSTN	Public Switch Telephone Network
SCM	Service Control Module



CDMA-based all-IP network illustration, referred to as 1XEV network architecture.

New Network Components and Capabilities

The profitable deployment of mobile data services demands that five key questions be answered:

- What new interesting features do I need to add value to the services deployed over my network?
- How easy is that equipment to integrate into my existing network?
- How will it enhance and simplify the service provisioning lifecycle?
- What are the costs to operate that equipment over the life of the networks/service?
- Will it scale independently in multiple dimensions?

The following questions are designed to help obtain answers to these.

1. What new core equipment is required to offer 2.5G/3G services? All-IP services?

It is important to understand what new equipment is necessary for the core of the data network for each step of the network evolution. Table 1 depicts new hardware typically required in the core of a 2.5G wireless network. The media resource function, application server, and media gateway are placed in 2.5G networks to gain integration of voice and data. However, some operators might introduce these components in the 3G or all-IP network rather than the 2.5G network.

The key requirements that operators should look for in either a GSM- or CDMA-based mobile data network infrastructure include:

- Deployment flexibility
  - ✓ Capable of supporting various data node deployments
  - ✓ Selection of interfaces supported for deployments
  - ✓ Able to independently scale sessions service and subscribers
- Carrier class redundancy
  - ✓ Purpose-built to maintain session information at failure
  - ✓ Capable of withstanding hardware and software faults
- IP services architecture
  - ✓ Purpose-built, fast-path packet processing architecture

TABLE 1

2.5G NETWORKS

GSM-based (GPRS)	CDMA-based (CDMA 2000 1X)
Gateway GPRS Support Node (GGSN)	Packet Data Serving Node (PDSN)
Serving GPRS Support Node (SGSN)	Home Agent
Charging Gateway Function	AAA Server
Application Server	Application Server
Media Resource Function	Media Resource Function
Media Gateway	Media Gateway

- ✓ Integration of service and transport layer intelligence
- ✓ Data flow control
- ✓ Ability to charge for transaction and content as well as time and volume
- ✓ Ability for the operator to monitor, meter, manage sessions and accounting data and apply network services on a per-flow basis to enable revenue-generating services
- ✓ Ability to leverage value of the existing SS7 (IN) network
- ✓ Real-time prepaid support for data subscribers
- ✓ Universal roaming access
- ✓ Multimedia access

> **RED FLAG**
> Support and professional services can be a substantial cost. Understanding how many people and the types of skills these people will need to maintain and manage the new equipment is important. Is it something only the vendor can do? Does it require one of your IT people? Can it be done by a less-skilled worker or perhaps completely automated?

Additional related questions:

1.1 Does your device collapse additional functions or devices? Collapsing functions and/or devices results in fewer devices and easier management.

1.2 How will the equipment be configured upon delivery? Can the wireless operator provide the vendor with an initial configuration to get the new equipment running quickly upon receiving it?

1.3 Does the equipment have a quick-start utility that allows for rapid configuration and setup?

1.4 Does your solution support protocols for internetworking with legacy equipment?

1.5 Does your solution require a forklift upgrade when the next generation of technology and services are deployed?

1.6 Can an operator cap its investment in existing legacy equipment and grow towards a next-generation network with your solution?

2. Can best-of-breed components be easily incorporated into the network? How? Describe the replacement and upgrade process for components.

The infrastructure components should be designed to enable true carrier-grade serviceability. This will allow operators to accelerate time-to-market and time-to-customer parameters and generate new revenues. Carrier-grade serviceability requires equipment upgrades and the introduction of new software and feature components to occur without any negative impacts on end users such as dropping connections. This is similar to the way class 5 upgrades are done in the voice world today. If the equipment

was designed with a forward view, many upgrades—if not all—will be software-based, which can be done remotely and less intrusively than hardware upgrades. All critical information should be duplicated so information will not be lost if a major failure occurs.

Additional related questions:

2.1 How do your company and products support migration?

2.2 Must all customers be cut over at once or can they be migrated in stages?

2.3 What operator training is required to perform upgrades?

2.4 How are software upgrades distributed throughout the network?

2.5 Do upgrades typically require a truckroll or any special equipment?

2.6 Are software upgrades done with N tier architecture? This allows only the affected software code to be upgraded.

3. Do you have the ability or have third-party partnerships in place to assist in the integration of new network components?

Having the option of third parties to help integrate new network components provides an option for operators without the in-house integration skills. The equipment vendors may have the ability to do it themselves, have agreements with third parties to help with the integration, or simply leave it up to the wireless operator. Knowing this information ahead of time can give the wireless operator an idea of the amount of effort required internally and externally to integrate the new components.

If the equipment vendor will provide integration assistance, some additional information should be obtained such as:

- List of integrators with which the equipment vendor works (if any).
- List of OEMs with which their equipment can interoperate.
- Explanation of how they can support integration of their products with existing equipment for a seamless integrated solution.

> ➢ **RED FLAG**
> Support and professional services will be critical when integrating the new 2.5G/3G equipment into existing networks. Look for vendors who have partnerships with big systems integrators, who have different levels of support available based on operators' needs, or who have their own professional services or service bureau branch to help you. Ideally the vendor will not only help you launch and maintain your services, but also have enough experience to help find hidden opportunities.

Additional related questions:

3.1 Is it possible to integrate your component as a stand-alone component? How?

3.2 What is your step-by-step integration plan? This plan should include the interfaces affected, how the equipment will be tested during the phases, and support in terms of test plans, test equipment, and test scenarios.

4. What are the key capabilities of the MRF or the third-party's MRF?

The MRF will be critical in deploying new enhanced voice services. Operators need to understand the key capabilities within the MRF that the solution inhibits. Examples of some key capabilities or characteristics operators should look for include:

- Open and flexible architecture
  - ✓ Support SIP/VXML and H.248 enhanced applications
  - ✓ Simultaneously scale applications and dynamically allocate resources (such as media, services, and bandwidth) to power converged services
- Drive converged services
  - ✓ Manipulate media-rich web content at carrier levels
  - ✓ Access decentralized storage and content from the web in a scalable fashion
- High-processing performance and future-proof
  - ✓ Low-latency media processing power to overcome VoIP latency challenges
  - ✓ Support single or multiple applications independently
- Migrate TDM legacy services and new converged applications
- Support 2.5 and 3G applications

Additional related questions:

4.1 How many real-time streams does the media resource function support? It should be able to support thousands to tens of thousands of real-time streams.

4.2 How many web content access sessions does the media resource function support? In addition, it should be able to support thousands to tens of thousands of web content access sessions.

4.3 What is the latency introduced by the media resource function? Latency less than 10 ms is recommended.

4.4 What 2.5G applications does the MRF support?

4.5 What 3G applications does the MRF support?

4.6 How does the MRF enable smooth migration of services from 2.5G to 3G networks?

5. What are the key capabilities of the mobile data network infrastructure?

Similar to the questions above, operators need to understand the key capabilities of the data network infrastructure. The ability to offer revenue-generating services requires more than just a high-speed, packet-forwarding router. Other capabilities are needed in the network and are essential for operators to enable new services.

Some of the key capabilities to look for include:

- Robust subscriber and element management
- Service-enabling IP infrastructure
- Flexible accounting and smart billing
- Reusable building blocks for back-office integration
  - ✓ True carrier IP reliability, availability, scalability, and serviceability
  - ✓ Partnering for profitability

Going Beyond the Standard Drivers for Evolutions

The quest for profitable and differentiated services must be the primary driver for the evolution of wireless networks. This not only represents a shift in the technology but also significant shifts in the way operators think about their businesses. They must move past the traditional silo approach of business and create tighter integration of the network service, design and operations teams along with the marketing and customer services groups. The success of this integration will be necessary in order to satisfy the new drivers of the next-generation network. These new drivers are the primary drivers for operators to move to next-generation networks and include:

1. Service enablement
2. Scalability
3. Manageability
4. Access
5. Security and resilience
6. Revenue and cost management
7. Future proofing

When operators develop the RFP's, these drivers along with the typical standards drivers should be considered. Maintaining focus on these drivers during next generation wireless network planning and implementation will help ensure the operator is positioning itself to generate new revenues and differentiate on services rather than pricing.

Service Enablement

Operators will introduce new services to increase their ARPU and subscriber base, differentiate from competitors and reduce churn. At this stage of market maturity, the exact services are not necessarily as important as the ability to easily incorporate a wide variety of new services efficiently. Architecting a future-proof services infrastructure that enables carriers to deploy single or multiple enhanced data, voice, or converged applications should be the service provider's primary objective. Users of the future will look to use voice and data and/or converged applications simultaneously as operators identify the successful combinations and applications. The network must rapidly enable the deployment of these new services. It must enable the creation, integration and provisioning of new services quickly and easily through the support of open, Internet-based protocols.

1. What specific services/applications do you currently support? Plan to support?

It is important to understand what types of services the equipment vendor's solution will support and what technology will be used. The services and applications will be the same regardless if you are implementing a GSM- or CDMA-based network. Table 2 contains a summarized list of sample services broken down and what technology is needed to

support them. The applications that require high data speeds will typically need 3G or all-IP technology since 2.5G will provide a limited amount of data bandwidth. Note that some of the 3G applications listed can be used with 2.5G technologies, but speeds might not be sufficient to provide a good end-user experience. The all-IP networks will combine high-speed data with enhanced voice services to create a rich, multimedia set of applications. Additionally, an all-IP network will enhance many applications that also work with 2.5G and 3G technologies.

TABLE 2

2.5G	3G	ALL-IP
Presence	Unified messaging	Streaming audio/video content
Availability	IVR	MPEG file download
Instant messaging	Voice portals	Video email
Basic gaming	File downloads	Video conferencing
Travel services	On-demand audio conf.	Movie trailers
Banking	MP3/audio streaming	Voice-enabled network gaming
Retail	Corporate LAN access	Interactive direction services
Auto tracking	Stock trading	
Email	Weather services	
Web browsing	Restaurant guides	
News push	Traffic updates	
Ebusiness card	Mobile ecommerce	
Movie information	Multi-modal	
Flight information		
Chat		
Voice IM		
Press To Talk		

The longer-term vision is for operators to integrate elements from each category to create compelling multi-modal applications such as incorporating presence, IVR (Interactive Voice Response), on-demand conferencing, chat, and text-based direction services into a wireless conferencing solution. While these solutions may be many years away from being reality, we believe operators should start planning their network infrastructures with these types of solutions in mind.

Additional related questions:

1.1 What marketing programs/resources are available to assist an operator in deploying these new services?

1.2 What strategic relationships are in place with ecosystem partners for the provisioning and delivery of services? It is important to note that services will be easier to implement if there is close coordination between core network vendors, integrators, and service/application vendors.

2. What capabilities does your technology have to help develop/deploy new services quickly?

There are many potential ways in which the equipment vendor solution can help with the launch of new services. The rollout of packet-based GSM and CDMA next-generation networks that exhibit open standards will enable carriers to mix and match best-of-breed components to create a flexible service creation environment. Mobile operators need to consider what capabilities they and third-party developers will need from the network infrastructure to deploy and enable new services. Using standard protocols, such as SIP and VXML, with these components allows carriers access to a wide pool of developers, which in turn leads to the development of innovative services. Carriers can reduce development and deployment cycles from months to weeks while increasing the pool of developers from hundreds to tens of thousands. Network infrastructure components capable of providing common capabilities related to security, subscriber identity, quality

of service, and accounting should be deployed in the network. These networking components should expose capabilities through standard and well-documented interfaces such as RADIUS, CORBA, and XML. Networking infrastructure vendors that provide standardized and well-documented interfaces will greatly facilitate in the rapid development and deployment of new services. The result is a more efficient and open service creation environment giving wireless operators the ability to prototype, test, and deploy applications in a very short cycle time.

Here are some specific metrics to be used as a guide for deploying new services:

- Training takes weeks compared to today, where it can take months.
- Service development shortened from 12-18 months to 3-6 months.
- Test cycle reduced from 12-18 months to 2-4 months.

Additional related questions:

2.1 Can accounting records be linked to new services with no impact on existing services?

2.2 What interfaces or software tools are included to simplify service creation or modification? For instance, having web-based interfaces that increase automation.

2.3 What applicable industry standards does your solution currently support?

2.4 Explain your standards compliance roadmap.

2.4.1 What 3GPP/3GPP2 release numbers are supported?

2.4.2 Can your equipment be upgraded to support new standards, and how is it upgraded?

2.5 Does the solution have open interfaces and the ability to logically partition the hardware resource quickly and dynamically?

2.6 Do you have a cohesive support and integration plan for the services' solution?

2.7 Can you provide some case studies of other 2.5G and 3G services you are currently supporting?

2.8 Who is actually deploying the new services—the mobile operator (enabler), the equipment vendor, third-party developer, or system integrator?

2.9 How does a mobile operator manage the flows between itself, the equipment vendor, third-party developer, or system integrator?

3. Can you enable the soft launch of services? How?

Unfortunately, nobody knows with certainty what the "killer applications" will be, so it is important to consider all possible services with the ability to soft launch those services. This uncertainty will result in a great number of service trials for many operators. These trials will consist of a limited launch, determining failure/success technically or by market

acceptance, and either launching or canceling. This will be an ongoing process and, therefore, needs to be efficient and relatively inexpensive. It will be important to put in place the infrastructure that allows for rapid trial procedures.

Additional related questions:

- **3.1** Can services be developed in a testing environment and then moved into production?
- **3.2** Is there a way to offer these services in a limited portion of the network (geographic area, class of user, community of users, etc.)?
- **3.3** Can a limited launch be done with existing hardware and simply a software change? Or does new hardware need to be put into place?
- **3.4** Can billing start small and then be scaled up if the service is fully launched?
- **3.5** How are new services introduced into the network and at what scale (up and down)?

4. Does your product support services from third-party vendors? If so, what needs to take place to make this happen?

The ability to incorporate new best-of-breed services from your strategic partners, content developers, and application developers will be critical. The key is putting together infrastructure with the appropriate mechanisms that will allow third-party applications to be enabled. These third-party applications will be a driving force for the creation of new revenue.

New network-based services and the introduction of new revenue streams will be accomplished by implementing a voice and data network infrastructure that can deliver personalized policies as building blocks for services and applications. The mobile data network infrastructure will need to provide the capabilities to enable new and innovative applications and business models. The infrastructure will have to support open and standardized interfaces to control and expose its capabilities to a third-party development community. In turn, operators may choose to expose certain subsets of policies to the overall Internet community, thus leveraging the creativity of a large community that can provide ideas for revenue-generating services to the operators' customer base.

The move to 2.5G/3G networks will allow operators to make more efficient use of the wireless spectrum, increasing the amount of voice capacity in the network and allowing for new enhanced voice services. Similar to the data infrastructure, operators will need to ensure the appropriate infrastructure is in place to take advantage of these third-party voice applications.

Coupled with these new services is the need for flexible accounting mechanisms. These mechanisms will enable new business models for mobile operators and standardize building blocks and APIs for application developers for simple integration of applications and services.

Additional related question:

4.1 What independent interoperability labs are available to test third-party applications/content? This can include partner or member forum labs.

5. Describe how new services are developed and incorporated into the network.

Third-party application/service developers provide the pool of creativity required to develop new and exciting applications. The key components for incorporating new applications into the network are the ability of the network to support revenue-sharing business models, per-flow accounting mechanisms, subscriber policy-based steering, and the establishment of a development community (APIs, etc.) for the applications. The true measure for how new services can be incorporated/deployed within the network is the ease in which the infrastructure can accommodate this need for flexibility.

An example for a new service that can be easily incorporated into the network is the accurate accounting for enterprise Intranet access. Mobile operators are eager to put together service packages for corporations to provide Intranet access for their employees. In this model, the operator would charge the corporation for all user traffic generated by a user accessing a VPN. A costly problem that a corporation would be eager to solve would be how employees' work-related usage should be separated from personal access to the Internet. A corporation might be hesitant to pay for wireless data access for an employee without knowing how much of the access is actually work-related.

Additional related questions:

5.1 Does your solution have the ability to integrate with services from ASPs (Application Service Providers)?

5.2 Does your solution allow developers to write to network APIs using open standards?

Scalability

Capacity should be able to be quickly added to the network in order to react to subscriber demands. The capacity must be able to scale independently against session, services and the number of subscribers without changing the fundamental network architecture. This will eliminate a large-scale re-configuration of the network infrastructure and minimize costly points of failure.

1. How does your product scale as new services and/or new features are added to existing services?

Wireless operators should look for the ability to independently scale and dynamically reallocate media. They should also understand what happens when new services or new features are added to existing services.

Also important is the ability to scale on three different planes: the control plane, the management plane, and the data plane. Each needs the ability to scale independently of the others. For example, if your new data services will increase the effective throughput

from 9.6Kbps to 28.8Kbps, the data plane might be able to handle that dramatic increase, but the control plane might not. So the ability to scale each one independently as needed is important.

> ➢ **RED FLAGS**
> Software is generally easier and less expensive but may not be capable to scale as large as hardware. Make sure to understand when software can be used to scale versus when hardware is required.
>
> Operators should understand how network equipment is affected as services or sessions are added on the network. For example, the performance of most equipment is severely impacted as more and more features are enabled. Knowing how equipment will be affected when there are VPN tunneling or thousands of SIP sessions happening will help operators plan the network appropriately.
>
> Other items that wireless operators might want to know are:
> 1. Call set up and tear down times
> 2. Session set up/tear down benchmarks
> 3. Busy call hold times

Additional related questions:

1.1 Can each plane scale independently?

1.2 Are new boxes needed to scale or can you use existing hardware to scale? How is this done?

1.3 What are the key resources and how do they scale within a single box or unit?

1.4 Provide some metrics associated around scalability including simultaneous sessions, access to content, number of busy hour call attempts, etc.

1.5 Can your solution scale without any service interruptions? If so, how?

1.6 Can you clearly show how your product architecture supports such scaling?

1.7 Provide specific examples of services that scale over time to meet the dynamics of the demands placed on the network as the service requirements evolve.

2. Explain how your equipment scales in terms of number of sessions, subscribers and services.

To achieve the necessary scaling that will be needed in the new 2.5G/3G environment, it will be necessary for the equipment to be able to scale subscribers, services and sessions independently. Independent scaling is necessary to ensure scaling can be increased for one factor without impacting the others.

> ➢ **RED FLAG**
> When vendors talk about the number of sessions to which their equipment will scale, it is vital to ascertain if they are referring to concurrent *sessions* or *users*. This is important because it is likely that an individual user will utilize *multiple* concurrent sessions.

Additional Related Question:

2.1 Describe the process of scaling each of the three factors – subscribers, services and sessions.

Manageability

The ability to effectively manage both the network elements and services will help simplify the provisioning of new subscribers and services. This will also reduce the integration of new elements, while consolidating and efficiently managing existing resources.

1. Explain how your equipment provides subscriber and service management.

Subscriber and service management is the key in obtaining manageability of the network. Some of the items you should look for in a potential solution include:

- ✓ Hooks provided to centralized management of subscribers and services
- ✓ Open APIs for integration with existing OSS systems and ecosystem partners
- ✓ Virtual gateway partitioning to enable the evolution of new business models
- ✓ Data plane capable of supporting zero overhead services
- ✓ Ability of an infrastructure component to introduce additional network services in the data plane without degrading overall performance

2. How is QoS monitored and enforced?

QoS will become more and more important to the wireless future. As wireless networks move to an all-IP infrastructure, QoS will be necessary to ensure adequate bandwidth is available for voice calls. Certain critical data applications will also utilize QoS capabilities to prioritize this data traffic over non-critical data traffic.

It will be required to bridge both the network and finance side of the systems and solutions—the network side to monitor and track network performance and the finance/billing side because operators will need to proactively credit customers when QoS standards are not met.

Additional related questions:

2.1 How does your solution map radio side QoS with data/IP/core QoS?

2.2 What QoS mechanisms are supported?

2.3 Can your products provide differentiated QoS services for voice, data, and multimedia?

Access

The access portion of the wireless network is critical to ensure subscribers can gain access to the network. It allows subscribers to maintain their mobile identity across multiple devices and use their services while roaming whether they are using GSM, UMTS, Wireless LAN, corporate VPNs or other access methods. This will become increasingly important as wireless networks evolve to 3G and all-IP. While these questions might not apply for 2.5G networks, it is important to understand current and future capabilities of potential vendors for 3G and all-IP networks.

1. **Does your system integrate with all Remote Access Network's (RAN's) agnostically?**

The ability to integrate RAN's agnostically will help to provide the same service enablement capabilities regardless of WLAN, GPRS, etc. As these technologies are implemented, a means to tie them together will be required.

2. **Does your solution allow seamless roaming giving subscribers access to their portfolio of services as if they were home based?**

As subscribers become dependent on wireless applications in their everyday life, the need for accessing their services anytime, anywhere will be important. This is typically called ultramobility in the wireless industry.

3. **Does your system enable subscribers to build one identity based on existing profiles in the voice network or pre-existing Access Point Names (APN) in their wireless data profile?**

The capability of maintaining one identity will simplify the provisioning of services and enable the end user to access services easily.

Security and Resilience

Security has always and will continue to be a big issue for wireless operators. As wireless technology progresses to always-on and end users utilize applications allowing them to access their corporate network, it will be vital that the security aspect is understood and accounted for. This typically includes providing an end-to-end solution with built-in security and resilience to failures. The following questions address some of the issues relating to security.

1. **Is it possible to view all subscriber data in real time?**

Wireless operators need the capability to view all subscriber data in real time. This will help them monitor and proactively catch any suspicious activity. In addition to real time data, the element should log all activity and administration by the user or element manager. A historical log should be held for no less than 5 days. This will give the operators insight as to recent activity for customer service and security.

2. Can you view secure subscriber information?

An example of this would include the ability of the operator to view the number and content of current multimedia messages that the subscriber has outstanding and received. Note that this secure subscriber information should only be able to be viewed if the receiver of the information has the appropriate decryption algorithm.

3. What type of encryption is utilized to hold subscriber information securely within the device?

Proper encryption techniques are essential to ensure subscriber information is secure. Operators should understand what strength of encryption is necessary and utilized by potential vendors. Typically, operators should look at the vendor to support a minimum of DES 128 encryption.

4. Does your solution support On Line Call Monitoring (OLCM)?

OLCM could be a viable way to investigate fraud or criminal activity. In addition, operators should ensure that the vendor will comply with the requirements for lawful interception of calls and data flows as specified in the "Investigatory Powers Act 2000."

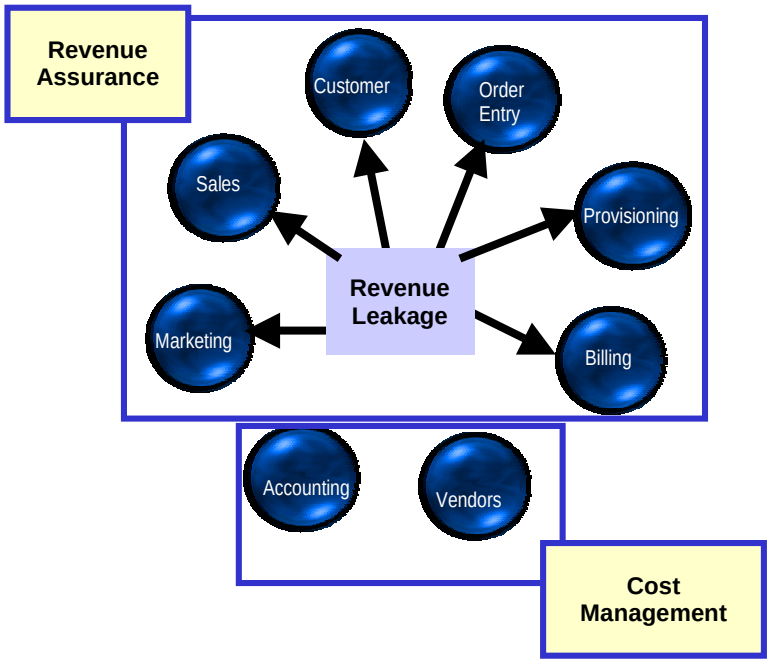
Revenue and Cost Management Systems

With the downturn in the economy and the increased focus on the bottom line, operators now search for ways to enhance profitability. Two ways to accomplish this goal are to better manage costs and increase revenues. Opportunities exist within current networking environments to accomplish both of these objectives.

The various processes that currently exist within operators create several problems. A typical back-office process of an operator might be described as follows: The sales person sells an offering to a customer, and sometimes discounts it or modifies it without consulting the marketing or the operations organizations, thereby either lowering margins or creating a service that does not exist. The order entry team then enters the order into the system. The provisioning team retrieves and provisions the order. If the order is not a standard order, provisioning may try to provision the closest possible alternative. Even if the order is a standard order, it is still possible that it could get provisioned incorrectly. The provisioning team needs input from the inventory systems to ensure availability of the order. This information can only be dependable if the inventory systems have accurate data. Finally, the billing systems need to bill for the provisioned order; however, if the process is broken, the billing system may not always bill or may not bill correctly for the orders in the system.

The net effect of these errors or process imperfections is a substantial loss in revenues, often in the range of 6% to 12%. These losses take the form of under billing, stranded assets, or incorrect inventory. Diagram 6 below articulates the process and the various areas of revenue leakage.

Diagram 6



In addition to revenue leakage, operators need to identify areas for cost management. Most operators either lease circuits from other operators or use their networks for interconnect access. Charges for these circuits are received on interconnect invoices. Interconnect charges are usually 50% to 60% of an operator's revenue. These invoices typically have a 6% to 12% error rate in the form of overcharges.

The revenue and cost management is broken into two sections: System Capabilities and Revenue and Cost Accuracy. The system capabilities section asks questions regarding the overall capabilities of the system in regards to revenue and cost management. The revenue and cost accuracy section asks questions regarding the system's ability to accurately account for revenue and cost issues.

System Capabilities

1. Does the system offer flexible workflow?

The ability to process invoices in accordance with the operator's workflow is an important factor to consider when evaluating a cost and revenue management system. A flexible workflow gives the operator the option to organize the flow of the document to match its specific business needs and resources. The workflow process also enables the operator to simplify vendor management and make it more efficient.

2. How flexible is the general ledger coding capability of the software?

General ledger coding flexibility gives the operator the ability to assign various charges to specific general ledger accounts. This flexibility gives the operator the ability to look at costs in different ways, such as by region or locally, to determine its margins for the products it sells. Selling products below margin only erodes profitability and can be prevented by the appropriate cost and revenue management system.

3. How is the system's performance audited and kept current?

Keeping current audits ensures profitable results. Additionally, the ability to perform facility audits **and** usage audits is critical for maximum returns. Other audits such as general audits and other charges and credits (OC&C) add to bottom-line enhancement. An operator should ensure that the cost and revenue management system it selects not only has the audits at a high level but also has the capability to offer the detail behind it to support its disputes. Disputes that cannot be supported cannot be won, resulting in no financial gain for the operator.

4. How scalable is the system?

To audit switched usage results, the system must handle hundreds of millions of event records a day. In the 3G network, these event records are referred to as IPDRs (IP Data Records). Hundreds of millions or even billions of IPDRs are generated in the 3G network.

To perform audits on these event records, it is imperative that the system be capable of processing them. An operator should ensure the scalability of the system or it will not be able to gain financial benefit from the system.

5. What are the supervisory capabilities of the system?

The system must offer managers the ability to:

- Set up and modify general ledger codes and companies' business rules for assigning codes
- Maintain invoice approval hierarchy based on the invoice amount and maximum dollar amounts that individuals in particular positions are allowed to approve
- Provide the option for invoices with a payment amount below a desired threshold value to automatically be sent to AP without requiring approval
- Route invoices to the appropriate auditors based on BAN (Billing Account Number)
- Configure the period after which invoices are considered late and marked accordingly in the workflow
- Automatically print various reports

6. What are the reporting capabilities of the system?

Easy-to-use reporting capabilities within a revenue and cost management system will offer managers the ability to analyze their business. Custom reports to meet business needs as well as pre-configured reports are important tools for any manager who wants insight into the business.

7. How are service records tracked and recorded?

Information derived from routers goes into IPDRs. Wireless operators need a way to track IPDRs to assure proper costs and revenues are marked, monitored, and tracked. It is important to know details such as the hierarchy of the record (where did it start and where did it go), what type of content, over whose facilities, at what service level, at what time of day, etc. Operators need software that reconciles and manages all those relationships. Aside from the mass of data, it can be difficult to do effectively because:

- Data, like content for example, has to go across multiple networks with multiple players (content, operator, long-haul provider, hosting company, etc.), resulting in operators needing a system that tracks and manages to ensure the appropriate compensation is distributed. This situation becomes even more complex with the addition of MVNOs.

- Operators must have a solid understanding of operating costs for different services at different times of day, which can help control shrinking margins.

- The type of data that the billing mediator needs has to be determined. This will depend on how services are charged such as per packet, per flow, by IP address, time of day, etc. This all has to be done in a scalable fashion.

- The end-user bill content and format also must be considered when determining how services are tracked and recorded. The wireless operators will need the ability to provide the end user with meaningful bills. If an end user is charged for downloading content, the wireless operator should have the capability of showing what content was downloaded or the site from which the content was downloaded.

> ➢ **RED FLAG**
> Wireless operators should make sure standard tools are supported for performing queries. This includes tools like Oracle 9i, Business Objects, BEA Weblogix, etc.

8. What types of database reconciliation are performed?

The records of wireless operators will need to be reconciled against multiple disparate databases. For example, data will need to be reconciled against external databases such as other operators, content partners, and suppliers as well as internal databases such as billing vs. provisioning, prepaid customer balances, service availability, etc. Wireless operators should ensure the vendor can do this and that this reconciliation is easily performed.

Revenue and Cost Accuracy

1. Does the software address both cost and revenue management issues?

It is critical for an operator to manage the costs as well as address areas of revenue leakage. As the operators move into new areas of content delivery and other value-added services, ensuring that revenue leakage is minimized is critical. For an operator

with $1B in revenues, a 6% leakage can result in revenue loss of $60M. Combine that with the 6% error rate in interconnect invoices or $30M, and the net effect is a loss of $90M from the bottom line. These are not productivity dollars that are lost. These dollars represent real cash flow used for day-to-day business operations.

2. What bill formats and data records is the software able to accept?

Since operators do business in various areas of the world and with various vendors, the software should be capable of easily accepting new bill formats either via an API or custom developed interface. As new services become available on the networks and new vendors get involved, the value chain and the invoice flow become more complicated. The software must address this new paradigm. In addition to the various bill formats, it must also accept various data records (e.g., CDRs, IPDRs, content data records, SS7, and other signaling systems).

Ensuring that the system can handle multiple invoice formats will enable operators to gain the most financial benefit from the system.

3. How does the vendor handle interconnect compensation?

Calls that originate on another operator's network and terminate on your network need to be tracked and billed back to the operator on which the call originated. Operators must ensure they are billing others for the calls they are terminating for them. Most operators cannot do this today or they have inaccurate data from which to do it. The opportunity loss here can be in the millions of dollars. A robust revenue and cost management system will offer a way to reconcile data for presentation to the interconnect billing system.

4. How does the vendor measure and assure billing accuracy?

By reconciling the order entry database against the billing database, an operator can identify those circuits for which the customer is either not being billed or is being under billed. Data shows that the occurrence of this error is about 5% to 7%. Even at a conservative estimate of a 3% error rate, the resolution of this problem can add another $30M to a billion-dollar operator's revenue stream—not an insignificant number. Under billing, as this application is called, is one component of the revenue management strategy.

5. What steps does the software perform for invoice processing?

Invoice processing is the basis of a good cost management system. Various steps in the invoice processing function are invoice receipt, integrity checking, business rule application, general ledger coding, general audits, invoice review, manual audits, analysis and disputes, invoice approval and accounts payable processing. A robust software system addresses the various steps and provides the ability to quickly load an invoice, put the general ledger code to it, and pay it. This saves substantial time for the operator.

Future Proofing

Operators should anticipate future requirements and implement solutions that use the natural building blocks to service those requirements when building the next-generation wireless network.

1. How do the components support MVNOs (Mobile Virtual Network Operators)?

MVNOs allow services and content to be distributed using either a wholesale or retail model. While there are a few instances of MVNOs in today's environment, they will likely become more important in the near future. Even if you do not plan on enabling MVNOs in your territory in the near future, it might still be important to have the capability given the speed at which the wireless environment changes. In fact, the future value of your network could be significantly higher if your network simply has the *capability* to enable MVNOs or another similar type of resource-sharing partnership.

Additional related questions:

1.1 Can the resources be partitioned? For example, could the operator partition part of a media resource function for an MVNO, another part for an enterprise customer, and another part for its own customers?

1.2 Does it support billing and metering in a wholesale environment?

1.3 How does the billing work when content is delivered using multiple suppliers? If three suppliers deliver content to a subscriber, payments to all three content providers are needed. These multi-supplier scenarios need to be tracked appropriately so payments can be administered.

2. How flexible is the product architecture to anticipate and enable yet unforeseen versions of future services?

The uncertainties of the future require the operator's network to be flexible in order to handle the unforeseen activities that might occur. Understanding the flexibility of the vendor's solution will give the operator an indication whether it will be able to handle these unexpected activities.

3. Does the system provide open APNs to enable third party service and application providers to stimulate the creation and deployment of new services within the operator's network?

Third-party developers will typically provide the majority of application development. Thus, the operator must ensure its network can integrate these applications into the network and also allow for third-party providers to integrate their services as well.

4. What capabilities does your system have to monitor and capture service and subscriber data?

The ability for operators to upsell customers to new or enhanced services will provide them with potential for increased revenues. The chances of success are increased if the operator maintains subscriber information and understands what services the subscriber is using. Marketing can also use this data for marketing specific services to specific users. Customer service can also utilize this information when the customer calls in for service or inquiries. All these situations provide potential upsell opportunities.

Summary

The wireless industry is at the beginning of the network evolution. This evolution will bring to market new and exciting applications that have the potential to change the way people communicate. Wireless operators wanting to capitalize on this opportunity will need to build a network capable of enabling these services quickly and easily. This mock RFP has provided some key questions operators should ask to make their network evolution a success. Operators who are successful at architecting a network capable of providing services will be able to create competitive advantages and drive new revenues for many years to come.

Appendix A: TeleChoice TeleFilter

The TeleFilter is designed to provide the wireless operator with an easy and effective means to analyze and rank RFP responses from the equipment vendors. It is composed of four main components: one component for each of the three sections contained (only one section shown here) in this mock RFP and another component that summarizes the results of the three components. The summary section determines the overall rankings and is based on the section rankings.

The TeleFilter allows you to assign weighting to each question based on how important that particular question and answer is to your situation. Rankings can be applied to each answer based on the overall level of satisfaction with the answer. The TeleFilter filters out the highest-ranking equipment vendor based on the rankings you assign on the answers to the RFP questions and the weighting associated with those questions. A TeleFilter example containing one section and a summary is shown below.

Service and Service Delivery Section

Services and Service Delivery

Number of different criteria

Companies Responding to RFP

No	Question	Weight	Company A	Company B	Company C	Company D	Company E	Company F	Company G
1	What types of services are supported?	10.0%	5	7	6	8	7	8	9
2	How quickly can new services be developed and deployed?	10.0%	8	6	5	6	8	6	6
3	Explain whether and how you can enable soft launch of services.	15.0%	9	7	8	8	5	4	3
4	How can the vendor help develop/deploy new services quickly.	15.0%	10	5	6	5	9	9	6
5	Do your products support services from third parties vendors?	20.0%	8	8	7	4	3	2	8
6	Describe how new services are developed and incorporated into the network?	10.0%	5	9	3	7	4	8	5
7	How are service records tracked and recorded?	15.0%	3	4	2	9	6	2	9
8	How does the vendor's solution encourage speedy provisioning of services?	5.0%	6	2	7	6	9	5	5
		100%							

Scale of 1-10 (1 is low; 10 is the best)

	Company A	Company B	Company C	Company D	Company E	Company F	Company G
Totals	**54.00**	**48.00**	**44.00**	**53.00**	**51.00**	**44.00**	**51.00**
Average	6.75	6.00	5.50	6.63	6.38	5.50	6.38
Weighted	7.00	6.30	5.55	6.50	5.95	5.10	6.55
Average Rank [1]	**1.0**	**5.0**	**6.0**	**2.0**	**3.0**	**6.0**	**3.0**
Weighted Rank [2]	**1.0**	**4.0**	**6.0**	**3.0**	**5.0**	**7.0**	**2.0**

[1] *Average Rank is based on an average of all the points assigned to each criterion. It assumes that the criteria would be weigh*

[2] *Weighted Average is based on a weight assigned to each criterion. The weight assigned is a % level of importance for each*

Each question asked in the RFP is contained here.

Each question is assigned a weighting depending on importance.

Each company responding to the RFP is listed.

Each answer is ranked based on satisfaction of answer.

Totals consist of the summation of the rankings.

Weighted consists of the weighted total for that company.

Average consists of the average rank for that company with no weightings applied.

Rankings are reflected for both the average and weighted totals.

Summary of Results Based on Weighted Average Rankings

Summary Results

	Business Definition Options						
Sections	**Company A**	**Company B**	**Company C**	**Company D**	**Company E**	**Company F**	**Company G**
Service and Service Delivery	1.0	4.0	6.0	3.0	5.0	7.0	2.0
Service Enabling Architecture	1.0	3.0	2.0	5.0	7.0	6.0	4.0
Systems	3.0	2.0	5.0	7.0	4.0	1.0	6.0
Total	5.0	9.0	13.0	15.0	16.0	14.0	12.0
Rank*	1	2	4	6	7	5	3

Each section is summarized here.

The ranking for each section and company is represented here. This can be done by "Totals," Average, or Weighted rankings.

Rank is based on the overall rankings. Company A is the highest-ranking company for this example.