Wireless and Wireline Data Service Evolution: Lessons to be Learned

By Mark Tubinis, Founder and Vice President of Development, WaterCove Networks
If there is a single lesson to be learned from the evolution of data services, it is that history continuously repeats itself. As mobile data service providers plan for infrastructure requirements there is much they can learn from the explosive growth of data services over wireline infrastructure in the late 1990s. With major demands for Internet services, Internet Service Providers (ISPs) were faced with rapidly creating infrastructure while simultaneously capturing subscribers. Most providers ultimately failed, and only those able to build brand value while deploying technology solutions that optimize network operations succeeded.
The best place to look for lessons is the history of ISPs toward the end of the last decade. As wireline operators built out network capacity, capital was drained and they were choked by the twin burdens of infrastructure investments and subscriber acquisition. Network providers had no visibility into the bearer path, so they lacked the ability to provide value-based services. ISPs quickly became commoditized into mere providers of access, and the inevitable price pressure forced massive consolidation. The inability to create differentiated services and premium pricing strangled those early ISPs, and swept away tens of billions of dollars in capital investments.
However, U.S. wireline operators did not get it all wrong. The decision to utilize best-in-breed vendors and build next-generation networks using open standards fueled a wave of innovation that helped to propel the industry forward. The entire industry's productivity surged as technologies achieved breakthrough-after-breakthrough by pushing more-and-more bandwidth through the same fiber pipe. Unfortunately, service innovation could not keep pace with the bandwidth explosion. The much-touted insatiable appetite for bandwidth was muted by the intractable last-mile problem. Carriers could simply not deliver end-to-end bandwidth or Quality of Service (QoS) control.
The experiences of the wireline ISP markets have reinforced the need for next-generation technology that offers the flexibility required to create profitable business models that enable long-term success. Mobile operators can avoid becoming commoditized access providers by deploying flexible and scalable technology that allows them to support adaptable business models. They can then create value-added services that support premium pricing and enable effective brand building that drives increased customer loyalty.
Only operators that accept a broad vision of the mass-market deployment of personalized mobile data services can identify key infrastructure requirements today that will allow them to future-proof their infrastructure. They will be able to learn lessons from wireline ISPs and prepare for the approaching era of uncertainty as they successfully migrate network infrastructure to support maximum adaptability during times of change. Operators will need the freedom to evolve their networks as the business case dictates, and in the meantime they need maximum flexibility to deliver new services, drive down operating costs, and support continual

migration throughout times of change.

Wireless operators today are standing at the proverbial fork in the road. They can ignore the lessons being taught by U.S.-based wireline carriers that blindly built generations of optically powered bandwidth without the access or the services to justify the expansion. Or they can learn from these lessons and apply them to the impending expansion to new data services powered by the promise of 2.5G, 3G, and 4G technologies. One of the key lessons to be learned from the "build it and they will come" approach that went on in many sectors of the bandwidth explosion within the U.S. is that it is a formula for disaster.

Ever-bigger pipes lowered the cost of transmission to zero, thus forcing the commoditization of bandwidth, lower Average Revenues Per User (ARPU), and the ongoing need to aggregate even more traffic to fill up pipes, keep revenue growing, and allow additional investments in building yet bigger pipes. This perpetual motion machine might have been plausible in a frictionless environment, but ever-shrinking margins and an increasingly competitive market has made this a no-win scenario. The only reason this process did not die an earlier death was the grease provided at the time by free-flowing capital markets. Euphoric belief in the new economy allowed both good companies and bad to climb onto the bandwidth expansion treadmill.

Addressing New Challenges

Mobile operators face all the challenges ISPs faced, in addition to several other daunting challenges. Mobility also adds a level of complexity not found in the wireline data infrastructure, since the operator has to deliver always-on data services to roaming users. The ability to manage mobility is a major challenge, and the ability to successfully deliver mobile services is a major portion of the value equation for mobile operators.

The mobile operator network must evolve from a single, circuit-switched voice network providing limited services billed at a simple, minutes-of-use structure to a complex of parallel overlaid networks supporting multiple types of access equipment and sophisticated applications with multiple billing models.

Wireline data has a fixed path, and the network operator has to flow the data over this path to deliver network services. The challenges facing wireline data service providers are "only" two-dimensional in nature-scale and reliability. Mobile operators face these challenges as well but they also face the challenge of supporting mobile subscribers and optimizing services over a finite spectrum. The nature of the interaction also changes. In the wireline world the sessions are point-to-point and tend to be fewer and longer than in the wireless world, where the sessions are mobile, bursty in nature, larger in number, and of shorter duration. Wireline operators had limited opportunities to create value and offer premium services.

The ability to meter the value that was flowing through these ever-quickening torrents of information was lost as transmission speeds eclipsed the old 64 Kbps circuit-switched world and raced through Mbps, Gbps, and now Tbps speeds. There was simply no way to participate in the value chain that the carriers had adeptly enabled but into which they themselves lacked visibility. This unfortunate miscalculation relegated the carriers to nothing more than plumbers collecting a fraction of the portion of the value they had once collected. Customers simply did not care how the pipes connected them to their services worked &#151 they instead cared only about whether the services they contracted for were being

reliably delivered. Today, mobile data operators are faced with the same conundrum.

The Need for Purpose-Built Platforms

The limitations of current-generation technology will potentially lead mobile data operators down the same commoditized path walked by their older ISP brethren. The progress of mobile data service penetration has been shackled by these limitations, and mobile operators need a new solution that addresses these shortcomings. Legacy, router-based platforms or edge aggregation architectures are insufficient for the challenges faced by mobile data service providers (Figure 1).

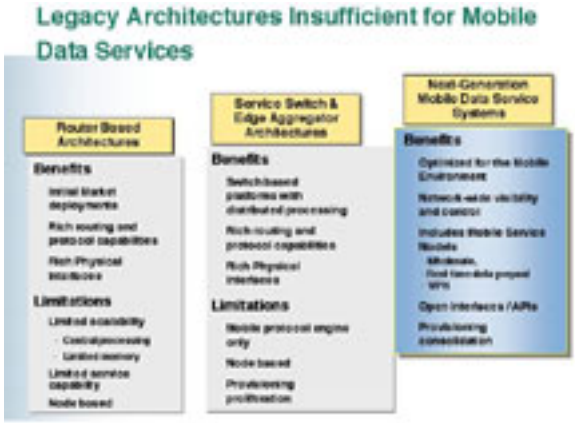

Figure 1: Next-generation mobile data service systems are required to meet the needs of mobile data providers.

They need innovative platforms that are purpose-built for the requirements of multiple operators so they can profitably develop scalable mobile data services that can enable new business models. They also need granular network visibility and control to take advantage of the unique relationship with the subscriber to enable value-based services. Next-generation purpose-built platforms will provide the network visibility and control, metering, charging, and scalability required so that mobile data operators can avoid evolving into commoditized providers of network access. Operators need flexible and powerful mobility management technology so they can truly offer always-on services to roaming users. They can avoid the road taken by ISPs and develop profitable new business models to support long-term growth.

The history of data networking has shown over-and-over-again that whenever there is profound shift in technologies and markets, purpose-built byways are needed to replace legacy solutions. Cisco routers, Ascend remote access servers, and Redback subscriber management systems are just some of the examples of purpose-built platforms that helped change the paradigm for delivery of services.

Operators need to deploy next-generation mobile data service systems based on purpose-built architectures that integrate service intelligence with metered transport to enable the profitable, mass-market deployment of personalized mobile data services. Delivering always-on mobile data sessions to roaming users is extremely complex, and operators require purpose-built solutions that will allow them to seize the opportunity to deliver innovative services and develop creative partnership models.

To support efficient scaling and enable rapid creation and delivery of services, next-generation mobile data service systems are needed to replace today's patchwork of edge routers, access concentrators, gateways, and soft switches with a mobile data

service system that integrates service intelligence with the transport requirements for high bandwidth into complementary components that are centrally managed. Operators also need to the ability to provide partitioned management to partners so that they can create wholesale revenue streams and provide maximum flexibility to mobile data subscribers (Figure 2).

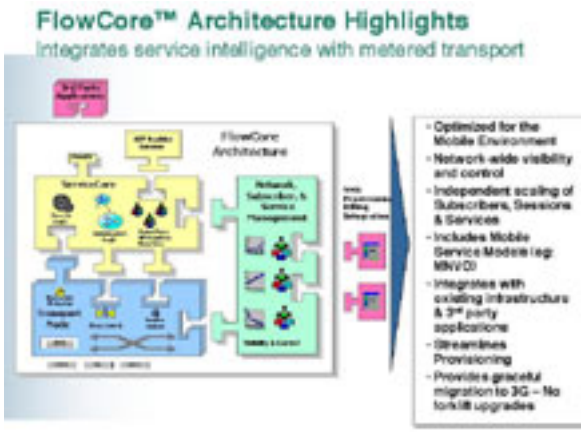

Figure 2: Next-generation architectures such as the FlowCore architecture from WaterCove Networks will enable the mass-market deployment of personalized mobile data services

The integration of highly available signaling management features with the highly scalable bearer-path features enables the independent scaling of sessions, services, and subscribers. This is the only way to allow mobile operators to cost effectively scale their data networks. Centralized, policy-based management of subscribers and network resources will enable efficient provisioning and provide a service deployment environment that allows third-party providers to rapidly deploy value-added services.

Network Visibility and Control

Mobile data network operators will also need granular network visibility and control so they can measure the impact of services on the network and continuously optimize billable capacity. They can then rely on detailed utilization statistics to contain operational costs and profitably deploy services. By knowing the true impact of services on network resources, operators gain the power to accurately analyze margins and focus spending on areas of maximum return. Next-generation purpose-built platforms can provide the fine-grain metering that is critical to efforts to support new business models, gauge network performance, and assess the network resource requirements of services. Mobile operators can therefore enable value-based billing and deliver premium content and services by implementing powerful metering based on time, volume, location, QoS, or content. They can implement and support creative business models by ensuring robust metering so that value can be successfully measured and shared among operators and their business partners (Figure 3).

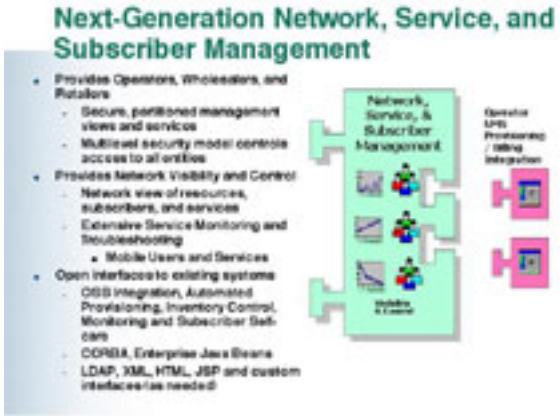

Figure 3: Operators need granular network visibility and open systems interfaces to enable new business models and effectively monitor the impact of services on network assets.

Network visibility and control also enables advanced subscriber and service and management with single-point provisioning. Operators can enable the rapid creation and delivery of revenue-generating services and reduce cost through subscriber self-care. Simplified service provisioning capabilities will include rapid, centralized, policy based, single-point service activation. Session-level virtual partitioning will support cost effective business models for partnerships in the delivery of wholesale services, and fine-grain metering with sophisticated mobility management will support always-on data services for roaming subscribers.
Real-time metering with the ability to provide stateful inspection of packet flows is the only way to deliver content-sensitive billing-which is essential for mobile operators determined to avoid becoming mere providers of access. New approaches to mobile data infrastructure will allow operators to charge for all types of data access requested by mobile subscribers. Thus they will effectively be able to build tollgates on the mobile commerce highway so that they can enhance their value proposition to subscribers without creating alternative revenue-generating opportunities.

Enabling New Business Models

The mobile world is changing swiftly and operators need to support flexible new business models. With purpose-built solutions that allow them to build based on value, they can support wholesale and partnering business models. Operators can finally gain the granular charging and partitioned management views required to support the profitable delivery of mobile data services on a massive scale. In the mobile telephony world the operator owned the entire value chain &#151 from the network all the way to the customer. But in the market for mobile data services, this vertically integrated model will give way to a horizontal model where different players will address the many aspects involved in delivering data services, including the radio network core mobile data network, applications, content, and the customer relationship. New business models involving both incumbent operators and new providers will emerge to support this transformation. These business models include:

Emerging mobile operators: A new class of mobile operator will surface that owns the customer relationship and the underlying network that develops internally or through partnerships the content and applications required for enhanced data services. First-tier operators that until recently followed an integrated business

model may be driven by rapid market changes to adopt this model and partner for content and applications.
Wireless ISPs (WISPs): Like emerging mobile operators, WISPs will own the billing relationship and the data network and partner for content and applications &#151 however, they will lease the mobile network from mobile operators in exchange for Internet access services.
Mobile Virtual Network Operators (MVNOs): Mobile operators will be able to lease the excess capacities in their network on a wholesale basis to MVNOs that will manage customer relationships and partner for everything else.
The changing landscape for mobile operators will demand flexible infrastructure solutions that enable creative partnering at various levels. This will result in opportunities for these new business models based on implementing creative wholesale and partnering business relationships. Operators need next-generation platforms that provide open system interfaces to integrate seamlessly with third-party content and application providers as well as existing operational support systems and business support systems. They will need to be able to implement configurable charging capabilities based on per-flow packet inspection and develop advanced service capabilities that allow value-based billing so they can deliver premium content and services.

Scaling in Three Dimensions

As higher-speed data throughput is delivered, mobile data operators will concurrently have to deal with scalability of always-on sessions and increased bandwidth requirements for more vigorous mobile data applications. Mobile operators need to be able to easily and rapidly deploy advanced, ultraportable mobile IP applications and services that provide access anytime from anywhere to always-on services. Subscribers will be able to maintain data sessions &#151 whether they are walking down the street with a handheld appliance or working on a laptop in a speeding train. This requires scalability on three dimensions: subscribers, sessions, and services.
&#149Operators will need to be able to support hundreds of thousands of subscribers while benefiting from centralized profile management and automated service selection. They will need to be able to implement policy-based management to scale the network to successfully address new revenue opportunities.

&#149The short bursting nature of mobile data sessions requires that operators officially establish sessions between mobile devices and content servers. Not only will many sessions be present, but each session may be carrying flows that approach several megabits-per-second. Operators therefore need to be able to set-up and tear-down hundreds-of-thousands of simultaneous sessions.

&#149By selecting next-generation platforms that integrate service intelligence and transport to provide a solid service delivery foundation, operators can successfully scale services. Without this architectural shift, it is impossible to develop and support services that require superior session control and real-time metering of data packets.

Learning the Lessons

Mobile data operators can avoid becoming commoditized access providers by deploying purpose-built platforms that allow them to deliver premium services,

applications, and content. They can build a service delivery foundation that allows them to evolve from homogenous to heterogeneous networks so they can integrate with third-party providers. They can learn lessons from ISPs and build open systems infrastructure that can scale effectively, enable new business models, and deliver increased network visibility and control.

Next-generation mobile data service systems deliver the power and flexibility required so that mobile data operators can profitably implement new business models, scale in multiple dimensions, and gain the network visibility and control that will allow them to deliver value-based services and flourish in the coming years as they support the mass-market deployment of personalized mobile data services to both corporate and residential subscribers.

Mark Tubinis is a founder and Vice President of WaterCove Networks, which is building next-generation mobile data service systems that will enable the mass-market deployment of personalized mobile data services. WaterCove Networks can be found at www.watercove.com, and Mark can be reached at mtubinis@watercove.com.

Source URL (retrieved on *03/11/2014 - 10:47pm*):
http://www.wirelessdesignmag.com/product-releases/2001/11/wireless-and-wireline-data-service-evolution-lessons-be-learned