True Convergence Demands a Communication Service Provider that Embraces a Customer-Centric Approach
TRUE CONVERGENCE DEMANDS A COMMUNICATION SERVICE PROVIDER THAT EMBRACES A CUSTOMER-CENTRIC APPROACH

INTRODUCTION

In the communications industry, the term convergence is defined as the integration of all forms of communication - data, voice, and video - onto a single (IP-based) network. In practice, enterprises have multiple business objectives for pursuing network convergence, such as:

- Network simplification
- Access flexibility
- Bandwidth optimization
- Service uniformity
- Supporting an increasingly mobile workforce
- Establishing a platform for new and advanced forms of communication (e.g., unified communications)

Of elevated importance during the current economic downturn is cost savings, savings that can materialize with each of the aforementioned objectives.

Yet, for its part, the industry has spent a considerable amount of time and money on developing what it labels as “converged” solutions. While captivating, this industry activity can also be confusing to businesses if they are left to wonder whether service provider converged solutions actually correspond to the same set of objectives they, business organizations, have with regard to convergence and whether and how soon cost savings will be realized.

We believe that to alleviate this uncertainty, the converged objectives put forth by the industry must tightly align with the objectives of businesses. This, however, may not be
entirely present as communication services providers (CSPs) can have their own set of inward-focused objectives and constraints as to what comprises and how to offer convergence.

To test this alignment, we believe a provider’s convergence objectives should be measured on how well they support the following three customer-centric objectives:

1. **Strategic** - Contributes to a business’ strategic goals such as penetrating new markets, enhancing company and employee productivity, deepening customer relationships, advancing new partnerships, improving the use of company assets, and adapting quicker to the dynamics of a competitive market.

2. **Cost Efficient** - Assists the business in being cost efficient in its capital investments and operational expenditures without impairing the organization’s pursuit of its strategic goals. Integral to this objective are fluid and cost-justified transitions to new communication technologies. In addition, administrators of the converged communication infrastructure need centralized and highly effective management tools.

3. **Secure** - Continuously safeguards intellectual property and private information that are conveyed through a converged communications network.

*Reaching tight alignment with these objectives is not an easy task. Yet, we believe when a communication services provider integrates these customer-centric objectives into the design of its converged solution, its business customers will no longer ask if the solution will meet their objectives. Rather, the question becomes one of execution: how and when to move to a converged communication solution.*

The purpose of this paper is to describe the attributes of a true customer-centric converged solution. From these attributes, a framework to measure and compare providers’ converged solutions emerges. We will conclude with a review of Sprint’s approach to offering true convergence to business and government customers.
CUSTOMER-CENTRIC CONVERGENCE ATTRIBUTES

Through Stratecast’s research, we have compiled six customer-centric attributes that should be at the heart of a communication services provider’s customer-centric convergence solution.

1. **Multiple network access alternatives** – Network access, the on and off-ramps to the core network, is a crucial element of convergence. Yet, a single access type is woefully insufficient given the range of scenarios in which end-users and business locations connect to a converged network. Access scenarios span multiple attributes: static versus mobile, narrowband versus wideband, public access versus private access, predictable versus on-demand, and a single connection versus redundant connections. Therefore, matching the access type or types to business requirements is critical to maximizing the benefits of a converged solution, serving the needs of the accessing constituents, and cost efficiency.

2. **Application performance management** - An often cited benefit of convergence is cost containment through network consolidation. Specialized networks (e.g., circuit switched, X25, Frame Relay, and ATM) have been a costly holdover when core networks were designed and built to incrementally address evolving communication needs. Having a standardized network protocol, IP, is step one in network consolidation. The next essential step is to match network performance characteristics (e.g., latency, jitter, and packet delivery) with each application. Class of service packet tagging and, for many providers, Multi-Protocol Label Switching (MPLS) are essential tools in ensuring appropriate performance for each application type traversing the providers’ core IP networks.

3. **Application transparency and session persistence** – A combination of wireless networks (2G, 3G, Wi-Fi, satellite, and 4G/WiMAX) and wired broadband access networks (DSL and cable) have profoundly changed how, when, and where business communication occurs, producing enhanced end-user convenience and improved business and end-user productivity and adaptability. However, maximizing the business benefits of expanded access options requires that business applications must be accessible across all access types and end-user devices, and application sessions continue without interruption as the access types change mid-session.

4. **Cost predictability and simplicity** – Pre-convergence, each legacy WAN service such as frame relay and ATM had its own unique set of cost elements. With knowledge of service inventory, orders, and usage, a business would have a fairly clear, albeit potentially excruciating in detail, understanding of its communication costs. Armed with this detail, a degree of predictability in communication cost is gained. In moving to convergence, the level of cost predictability should be equal if not better compared to pre-convergence. Furthermore, simplicity in managing costs is gained as the number of network cost elements is reduced.

5. **Application visibility and control** – Also in a pre-convergence environment, the criticality to proactively monitor application performance was partially assured
through the selection of the network technology. Specialized networks with performance attributes designed for specific applications provided network and telecom administrators confidence that specific application performance requirements would be met. With convergence, applications with differing performance requirements are merged onto shared access and core networks. Consequently, application performance cannot be assumed; it must be managed. To serve this need, administrators must have real-time and historic application-level visibility to confirm that performance remains within reasonable bounds (i.e., not detrimental to business operations). In addition, administrators need the flexibility to granularly define and enforce traffic policies to effectively manage application performance and bandwidth use. To achieve this, administrators need powerful management tools that enable them to make changes in real-time.

6. **Private communications** – Implicit in any enterprise network is the exchange of sensitive and proprietary information crucial to business operations. Prior to migrating to a converged network, enterprises must have assurances that the access and core networks support private communications.
SPRINT® AND CONVERGENCE

Sprint has a long history of convergence advocacy. Prominent examples of this are the company’s all IP core network built end-to-end with Cisco equipment, wired-wireless integration services (commonly referred to as Fixed Mobile Convergence), Sprint’s next-generation unified communication services and, more recently, the introduction of 4G/ WiMax wireless service as a local access alternative. However, these examples insufficiently capture the breadth and depth of Sprint’s convergence strategy and how that strategy aligns with our list of customer-centric convergence attributes. For that, we list by attribute the connections with Sprint’s convergence strategy.

Multiple network access alternatives

As network access has evolved from solely wired to a combination of wired and wireless, Sprint’s access options have reflected this change.

Wired

Sprint supports its Internet and Global MPLS services with wireline access types from traditional TDM (e.g., DS1) to Optical (e.g., OC3) to DSL to Ethernet, with a broad range of bandwidth levels. Demand in particular for Ethernet access is growing rapidly among enterprises. Consistent with this, Sprint is actively expanding the availability of Ethernet access, now in 24 U.S. cities and 30 countries.

With the globalization of business, Sprint has extended its flexible and secure IP network outside the U.S. to more than 137 countries through its own facilities and through Network-to-Network Interfaces with regional communication services providers. As an example of Sprint’s international intentions, Sprint has doubled its network capacity in Europe, increased trans-Atlantic cable capacity, enhanced Asia connectivity, and expanded its network in Eastern Europe, India and the Americas just in the last two years. The resulting benefit to Sprint’s international-operating customers is that the same connectivity and communication services that ride Sprint’s IP core network among U.S. locations are extended to non-U.S. locations.

3G Wireless

Sprint’s nationwide CDMA mobile broadband network, reaching over 269 million people (including data roaming), represents the cornerstone of the company’s wireless access offering in support of convergence. With an upgrade to Rev A in 2007, subscribers of Sprint’s Mobile Broadband experience download speeds averaging 600 Kbps-1.4 Mbps, while upload speeds average 350-500 Kbps. With a software-based architecture that contributes to rapid, cost-efficient (relative to hardware upgrades), and user-transparent upgrades, we anticipate that the company will continue to push the technology limits on mobile broadband connectivity.

Further extending wireless as a convergence access mechanism, the company introduced a 3G high-speed wireless interface card in 2007. Router-compatible, businesses can use a single mobile broadband card to simultaneously support access for multiple devices (e.g., laptops and point-of-sale devices) connected to the router via Ethernet or Wi-Fi. In
2008, Sprint led the market with the commercial introduction of femtocell technology, an Internet-connected base station that enhances in-building cell coverage. Although presently positioned as a consumer service accessible through Sprint cell phones, femtocell technology represents further evidence that wireless is becoming increasingly pervasive and the access mechanism of choice for end-users. The 2009 introduction of MiFi, a palm-sized wireless router, is another example of this trend of pervasive wireless connectivity.

**4G Wireless**

Sprint is the first U.S. wireless carrier to offer 4G services. Sprint, through its majority ownership of Clearwire, is rolling out a nationwide WiMAX-based service. This service provides users an advanced mobile broadband experience, similar to the “never-turn-back” experience end-users realized in migrating from dial-up to broadband Internet access. As this WiMAX service matures in geographic coverage and market availability in 2009 and 2010, we anticipate that businesses will make the swap from wired access for a broader set of essential business applications. As a proof point, 3G is already gaining acceptance as a wired alternative for a subset of business applications when location flexibility and connectivity deployment speed are top criteria. In addition, 3G is increasingly being utilized for access failover. Reliant on radio frequencies instead of a physical conduit, 3G and in the future 4G adds beneficial access diversity to business continuity plans.

**Application performance management**

As previously described, convergence, made possible through the use of a single networking protocol, results in network simplification. On its own, however, network consolidation does not ensure proper performance attributes for each application (e.g., voice, data, and video). For that, applications must be identified by type and processed through the access and core network in accordance with their individual performance requirements. For most providers, MPLS is the enabling routing technology to merge all applications onto a single core network and honor the quality of service (QoS) attributes required of each application. Class of service tagging, generally with diffserv, marks packets for traffic prioritizing on access links and assignment to the appropriate quality of service category within the provider’s core network. Sprint is differentiated among communication services providers in having only one quality of service category in its core network – the highest. Because Sprint’s core IP network runs congestion-free, every application, from voice to web surfing, gets the same performance benefit. For Sprint customers, packet tagging is only needed to manage bandwidth where bandwidth contention is most likely to occur, that is, in the access links.

It is important to note that quality of service attributes differ among applications. For real-time applications like voice and video, the network performance parameters for latency, jitter, and packet delivery are more stringent than common data communication such as email, file transfers, or web surfing. Additionally, it is inappropriate to group all data communication flows into a single category, as business objectives among sub-categories of data communications do differ. For example, extremely reliable high speed
delivery is essential in several brokerage and banking applications. Sub-second delivery delays can materially impact transactional operations. Therefore, classifying data communications into several categories based on business objectives is just as appropriate as having separate classes for voice and video. Sprint supports seven classes of service for traffic prioritization on the ingress and egress access links.

Of note, Sprint is the first global carrier to receive the Cisco IP VPN Multi-Service QoS Certification and the Cisco TelePresence Connection Certification, which recognizes the inherent quality of Sprint’s Tier 1 global IP network architecture to support convergence of voice, video and data over a single IP/MPLS network. Sprint’s 100% end-to-end Cisco-powered network is the foundation of its IP and broadband portfolio. As a testament of the suitability of Sprint’s IP core network for voice traffic, several of Sprint’s largest customers rely on this network for their voice communications.

Application transparency and session persistence

Several tangible examples of application transparency and session persistence are present with Sprint converged solutions.

Sprint Mobile Integration

With Sprint Mobile Integration, all VoIP-enabled user devices (wired and wireless), regardless of Sprint-provided access type, are extensions of the PBX, just as traditional phone stations in an enterprise LAN. Tangible benefits of Sprint Mobile Integration include:

- One-number reachability wherein each user maintains a unique PBX extension number that follows the user as he/she moves from one device to another (cell phone and desk phone)
- Unified voice mailbox and abbreviated dialing (4, 5 or 7-digit)
- Seamless transfer of live voice sessions from cell phones to desk phones and vice versa with a single keypad selection

Sprint Mobile Integration produces cost savings on several accounts:

- Eliminating the need to deploy desk phones for highly-mobile employees with no loss in advanced telephony functions and features
- Minimizing the number of costly local trunks due to the migration of a portion of voice traffic to wireless
- Reducing mobile usage minutes as calls to and from mobile devices on the enterprise’s dial plan are treated as “on-net”

Furthermore, call restrictions are extended to mobile devices allowing businesses to ensure wireless use is appropriate and call auditing capabilities facilitate corporate governance.
**IP Telephony**

As telephony needs differ across businesses, Sprint offers two services for enterprises to gain IP Telephony functionality: SIP Trunking and Sprint Managed IP Telephony. Both of these services leverage the Sprint IP network to ensure high quality voice communications. With Sprint SIP Trunking, businesses receive the feature benefits of IP telephony while maximizing network capacity and minimizing the number of trunks used compared to traditional trunking. Sprint SIP Trunking integrates local and LD services over a single trunk for multiple locations and applications. PBX interoperability with SIP Trunking is critical in enabling next-generation services, and Sprint has certified interoperability of its SIP Trunking service with IP PBXs from Microsoft®, Cisco, Nortel, and Avaya.

Sprint Managed IP Telephony service is well suited for enterprises that are migrating to premise-based IP PBXs. This managed service includes end-to-end design and configuration support, and proactive management and monitoring of the enterprise’s telephony equipment. The benefits of integration are also present with Sprint Managed IP Telephony service; and the combining of voice and data communication traffic over a common access link adds to potential cost savings.

**Enabling Unified Communications**

Unified Communications, as the name conveys, seamlessly combines or unifies several communication technologies together. Consequently, the robustness and feature richness of Unified Communications is cumulatively tied to the supporting communication technologies and their integration. Sprint has the bases covered with a strategy to enable Unified Communications including the Sprint Global MPLS/IP network, Sprint Mobile Integration, Sprint SIP Trunking and, described below, vital technology partnerships and certifications.

Sprint has teamed with best-in-class technology partners such as Cisco, IBM® and Microsoft to smartly meld day-to-day communications including email, voicemail, instant messaging, calendars, fax, audio and video conferencing into a common user experience. Specifically, Sprint has earned certification of SIP Trunking with Microsoft Office Communication Server 2007 R2 in early 2009. Sprint SIP Trunking and Mobile Integration are available with Cisco Unified Communications Manager and IBM Lotus® Sametime® Unified Telephony platform.

On a practical case study, Sprint has deployed its own Unified Communications strategy, realizing significant cost savings including $6 million annually with an incremental $2 million every 18 to 24 months by eliminating the need for PBX upgrades and maintenance.

**Cost predictability and simplicity**

Convergence produces cost savings by joining previously separate network environments and eliminating local trunks by migrating certain types of voice traffic to wireless traffic. Logically, one network environment for voice (inclusive of network access lines, premise-based equipment, and systems and personnel to oversee the environment) and another
for data are intrinsically greater in cost than a single, converged network environment that supports multiple traffic types. Savings first come to light in the investments required to separately serve the peak traffic loads of each traffic type. With convergence, the investments to accommodate peak traffic flows are based on the projected peak traffic flow for voice and data combined. With non-simultaneous occurrences of peak traffic flows, the investments in a converged network will inherently be less than the investments in separate networks. Moreover, with granular visibility into the types of applications consuming bandwidth and effective use of traffic prioritization policies, enterprises can further optimize their use of bandwidth and, through this optimization, postpone future network upgrades.

A barrier to reaching the cost saving benefits of convergence described above is the inability to project, with certainty, the amount of bandwidth needed for each class of service. Understating the peak bandwidth to reserve for voice traffic, for example, creates a risk that voice quality will suffer when the voice traffic load exceeds its reserved bandwidth (i.e., delayed or dropped packets in the carrier’s network). Conversely, by overestimating the peak bandwidth requirement for voice, the enterprise can lessen this quality degradation risk. However, this intentional overestimation offsets the cost savings of convergence if the provider charges a higher rate for the voice versus other classes of services.

Sprint alleviates this dilemma with zero-rated class of service pricing. Sprint’s MPLS customers are only charged for port and bandwidth, instead of price differentiation based on traffic classes. Even if the customers’ voice traffic bursts to the full amount of available bandwidth, Sprint’s customers do not incur incremental fees and have minimal risk that voice or any other higher priority traffic with stringent network performance requirements will suffer. The latter is the result of Sprint engineering its IP network to accommodate subscribers’ cumulative bandwidth as if all subscriber traffic were real-time applications like voice or video. In addition, Sprint designed its entire IP network with FastReroute capability to automatically reroute traffic to redundant and physically separate backbone links in the event of a link disruption, such as a fiber cut.

Another cost-savings benefit of convergence is the elimination of additional usage or toll fees. With Sprint Mobile Integration, for example, there are no additional costs for on-net calls. Whether calls originate from a Sprint wired access line location or Sprint mobile wireless device, calls within the enterprise dial plan are considered “on-net” and do not incur mobile usage minutes, including mobile-to-desk, desk-to-mobile, and even mobile-to-mobile calls.

**Flow-based visibility and control**

Even with a single class of service, business network administrators need visibility into the end-to-end performance attributes of its traffic, particularly if deviations from standard performance levels impact business operations. This need for traffic visibility increases in criticality as the number of traffic classes increases and as the enterprise’s network topology moves from a point-to-point topology to fully meshed (e.g., for supporting intra-company voice calling among all MPLS-connected locations).
Sprint MPLS customers, even those who do not subscribe to any of Sprint's managed network solutions, have access to historic and near real-time performance measurements for each communication flow. This visibility is available through Sprint’s Compass web portal. This portal displays for Sprint’s customers the same information utilized in Sprint’s Network Operation Center. With this highly granular information at their fingertips, Sprint’s customers are better equipped to respond to performance issues before they become business impacting. Equally important, the real-time confirmation of network performance assists Sprint’s customers in focusing their investigation and resolution of performance issues to elements of the end-to-end communication environment that are owned and operated exclusively by the customer (e.g., device mis-configurations and overtaxed application servers).

Modifying the class of service tags associated with each application is a control mechanism that is common among providers offering a MPLS VPN service. A similar control mechanism is not needed with Sprint’s MPLS service as Sprint supports bursting to the full level of available bandwidth at the highest class of service without its customers paying a financial premium. The enterprise, however, still needs to be proactive in tracking its bandwidth utilization level and plan for bandwidth upgrades coincidental with need. Sprint managed services personnel are available to assist businesses in planning access and network upgrades.

**Private Communications**

By its very design, an MPLS network ensures communication privacy through segmentation of subscriber traffic. As evidence of this, companies in industry verticals where content privacy is paramount, such as retail, health care, government, and financial, have made the transition from legacy services to MPLS with Sprint.

For user access that occurs through private wired access networks (e.g., private line and Ethernet) end-to-end privacy of the communication stream is ensured. For wireless, Sprint’s Data Link service provides the privacy equivalent of private wired access over the company’s mobile wireless network.

There will be occasions in which access occurs over public access networks (e.g., Internet and WLANs). Remote access for traveling employees and teleworkers are common instances. Sprint offers a combination of IPsec and SSL VPN services that encrypt the communication session to ensure privacy.

Another element of security is protecting subscribers’ networks, servers, and end-user devices from Internet-based attacks, malware hidden in websites and email, and spam. Sprint offers an array of security services from within its network to mitigate these risks. By functioning within the Sprint network, Sprint’s customers realize multiple benefits:

- Reduced investments in and management of premise-based security technologies
- Uniformity as all customer locations connected to the Sprint network receive the same level of protection configured through a centralized security administration platform
Optimization of access bandwidth by reducing the volume of unwanted and/or malicious traffic traversing over access networks and reaching Sprint's customer locations. For example, vendors of spam filtering products have calculated that as much as 90% of business email is spam.

CONCLUSION

Convergence is happening and IP is quickly becoming the default network protocol. Stratecast’s recent market research on Frame Relay and ATM confirms that these traditional WAN technologies are declining at accelerating rates. MPLS has become the WAN technology of choice because of its proven ability to support multiple and diverse simultaneous application flows, separate and secure subscriber traffic, scale from narrowband to gigabit levels, and support partially to fully meshed network topologies. Furthermore, MPLS is the foundation for enabling Unified Communications – a unique opportunity to drive valuable benefits of increased employee productivity, reduced costs and improved customer satisfaction to help maintain a competitive advantage.

At the center of this transformation to convergence is the Communication Service Provider. Effective convergence providers, as described in this paper, have designed their convergence solutions to meet the business objectives of their customers. Sprint is such a convergence provider.

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