The Effectiveness of Carrier-based Wireless Broadband
"the clear choice for Enterprises"

This paper discusses how carrier-based wireless broadband technology enhances the dynamic Enterprise business environment by providing a competitive edge to corporations that embrace broadband wireless mobility services and applications

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1. Executive Summary:

Carriers around the world have, and will continue, to invest billions of dollars in their networks to make them web-capable. It is analogous to the period of time when governments spent heavily to build the interstate highways—very good for citizens, very good for auto manufacturers, and very good for commerce and business in general. At some point in the very near future, making a broadband wireless connection, outside of the work environment, will be as common as making a cell phone call. The carriers are leading the way, and they will make it happen.

The advantage to businesses is that Enterprise-critical applications can move outside of the Enterprise's confines, to be on the road—and still be linked to the corporate backend systems to provide real-time data transmissions and updates. Several systems integrators and middleware suppliers, such as BearingPoint and IBM, are developing software to integrate data capture on the road with their backend ERP systems. Many vertical applications in Transportation and Logistics will take advantage of these capabilities: the package delivery person, the pharmaceutical detail people, etc. The advantage to Symbol is that we make the mobile computers that capture and move the information.

The carrier-based wireless networks that are being deployed around the globe are in all aspects the best technical alternative available to Enterprise customers seeking ubiquitous coverage. Carrier-based wireless broadband is far superior to wireless local area alternatives in that it does not require its users to be within the limited geography of a LAN network, nor does it put its users' personal information at risk while subjecting them to ads. As for non-carrier, fee-based wide area networks, they are still in an early and fragmented stage of deployment, but could in the future complement carrier-based wireless networks. On the other hand, carrier-based wireless broadband is here now. It works, the carriers are behind it, and businesses are looking to take advantage of the coverage, reliability and security that it provides.

2. Mobile Workforce Requirements for Vertical Markets:

Today's mobile workforce sends and receives large and more complex email attachments, as well as significantly larger files that are part of the operational databases of the Enterprise. Mobile workers also require real-time access to Enterprise-based proprietary information that enables them to be more productive and allows for more efficient management of the Enterprise. Enterprises that promote workforce mobility also have strict requirements about data security and privacy.

In addition, it is expected that enhanced web browsing will drive mobile adoption. As a result, higher speed wireless access to Enterprise proprietary databases is projected to lead to the rapid deployment of broadband wireless networks, even though it is recognized that most vertical applications do not presently need 3G data rates.

Another requirement of mobile workers is to have all of their broadband wireless needs met with a single rugged device that provides both voice and data connectivity.

Table 1 illustrates some requirements of today's mobile workforce in specific vertical markets:

Government	Healthcare	Manufacturing	Retail	Travel/ Transportation	Wholesale Distribution
• Asset Mgmt	• Asset Mgmt	• Asset Mgmt	• POS Solutions	• Tracking	• Productivity Optimization
• Security	• Communications	• Shop Floor Mgmt	• Customer Solutions	• Security	• Fleet Mgmt
• Public Safety	• Monitoring	• Quality Mgmt	• Inventory Mgmt	• Baggage tagging	• Field Force Mobility
• Operational Support	• Operational Support	• Material and Warehousing Mgmt		• Shipping Solutions	

Table 1

3. A Wireless Broadband Awakening:

Wireless broadband technology is revolutionizing the way Enterprises perceive wireless connectivity. For the traditional vertical Enterprise segments e.g., Field Service, Healthcare, Public Safety and Utilities, wireless broadband technology is enabling new and exciting business concepts, strategies and workforce productivity improvements that previously were impossible. The following are some examples of Enterprise efficiencies made possible by wireless broadband:

a. Mobile Professionals
   • High speed and secure mobile VPN access
   • Sending large e-mail attachments, e.g., Video, Powerpoint, Spreadsheets, Diagrams, etc.
   • Instant application update and event planning
b. Field Technicians/Sales Force Automation
   • Access and develop real-time solutions for high bandwidth critical situations
   • Mobile/remote JIT applications (e.g., instantly obtaining inventory levels), WIP status and order placement as needed
   • On-site location training (how-to videos) and comprehensive online/database retrieval aids
c. Healthcare and emergency response teams
   • Mobile/remote patient screening procedures
   • Emergency site patient diagnosis and vital sign monitoring
   • Emergency response and remote triage connectivity to main health centers

As seen in the examples above, wireless broadband capabilities continue to attract Enterprises that previously did not consider themselves candidates for WWAN data applications.

Table 2 shows Enterprise business segments and the functions that are likely to benefit from the deployment of broadband wireless networks:

Vertical Enterprise Business Segments	Enterprise Functions
Building and Construction	Appraisers and Adjusters
Communications	Architects and Construction Foremen
Field Service	Customer Support
Field Sales	Route Sales, Deliveries
Financial Services and Banking	Driver and Dispatch Personnel
Healthcare and Medical	In-Field Technicians
Manufacturing	Medical Doctors and Nurses
Real Estate	News Reporters and Photographers
Retail	Sales/Marketing/Business Development
Utilities	Stock Brokers and Loan Officers
Warehousing	Real Estate Agents

Table 2

Clearly, the target demographic for Enterprise employee populations has expanded well beyond the traditional mobile professional and business traveler to encompass many more workforce categories.

4. Wireless History from AMPS to Wireless Broadband:

Enterprises are continuously looking for ways to increase employee productivity (sales and customer development) and to achieve greater efficiencies in their operations (automation) and productivity in their processes (manufacturing and distribution). Digital broadband wireless networks are a vehicle that allows Enterprises to achieve these goals since workers can be deployed where they are most needed, while maintaining high speed wireless access to the Enterprise's proprietary databases.   To meet this market demand, wireless operators have been deploying faster and faster networks that enable mobile users to merge in-office applications with in-field/remote work requirements; those networks essentially provide a "desktop" experience to mobile Enterprise workers demanding up to the minute status on mission critical information.

The wireless revolution started in the 1970s and early 1980s with the deployment in the U.S., Europe and Japan of analog cellular systems based on AMPS (Advanced Mobile Phone Service) technology. These analog systems were incompatible and did not allow for roaming between service providers. To address this incompatibility, Europe created a single digital mobile service with advanced features and easy roaming. The new digital service, GSM (Global System for Mobile communications), was adopted by twenty six European countries. Commercial GSM networks started operations in Europe in 1991. Two years earlier, in 1989, to address the need for more cellular capacity, the U.S. decided to deploy digital networks based on CDMA technology. Presently, GSM and CDMA are the two accepted global standards.

In 1996, Nokia introduced the 9000 Communicator, a GSM mobile phone and handheld computer. Besides sending and receiving faxes, it could check email and access the internet in a limited way. Its effectiveness was limited since cellular networks were optimized for voice, not data. To handle data efficiently, the first generation of analog circuit switched networks had to change to packet or IP switched networks and the network operators started to play catch up with the handsets' multimedia capabilities.

The second generation of wireless networks (2G) was digital; it could handle SMS (Short Message Service/text messaging) in addition to voice, but could not handle faster services. Examples of 2G networks are cdmaOne (Verizon and Sprint) and GSM (Cingular and T-mobile). The current generation of digital wireless networks (3G) can handle data rates up to 2 Mbps (speeds approaching Local Area Network data rates) and, therefore, is ideally suited for the most challenging Enterprise applications such as streaming video, large document file downloads, location-based services, mobile computing with high speed internet access, and mobile commerce. 3G networks go by different names such as CDMA2000, 1xEV-DO, GPRS/EDGE and W-CDMA (Wideband CDMA). Today, operators around the world are migrating their 2G networks to the higher speed 3G networks.

The introduction of voice-only handsets allowed users to become untethered from their offices and introduced the concept of the mobile workforce. Today, handsets that can handle all types of data along with the deployment of state-of-the-art broadband wireless networks have allowed Enterprise workers to utilize their desktop applications remotely, resulting in higher employee satisfaction, improved productivity and job effectiveness away from the office environment. According to the Yankee Group, more than 40% of today's workforce is considered mobile. This increased mobility was enabled by new tools and technologies in wireless communications and the increased usability, functionality and application support for mobile devices. This trend is projected to continue with future generations of wireless networks that are expected to handle faster voice, data and video applications.

5. Deployment of Wireless Broadband Networks:

Wireless operators around the world have invested billions of dollars in 3G technologies such as CDMA 1X, 1xEV-DO Revision A, WCDMA and HSDPA, which provide greater network capacity and a lower cost to deliver voice, multimedia and broadband data. As shown in Figure 1, Gartner Dataquest forecasts that 54% of all 2006 wireless capital spending by operators is going to CDMA2000 and WCDMA infrastructure. By 2007, the firm expects spending to increase to 61% for 3G infrastructure, as spending on 2G technologies like GSM continues to decline. Strategy Analytics also predicts that more than half of the global spending for 3G wireless infrastructure will go to CDMA2000 and WCDMA during 2006, and that 2G technology investments will continue to decline.
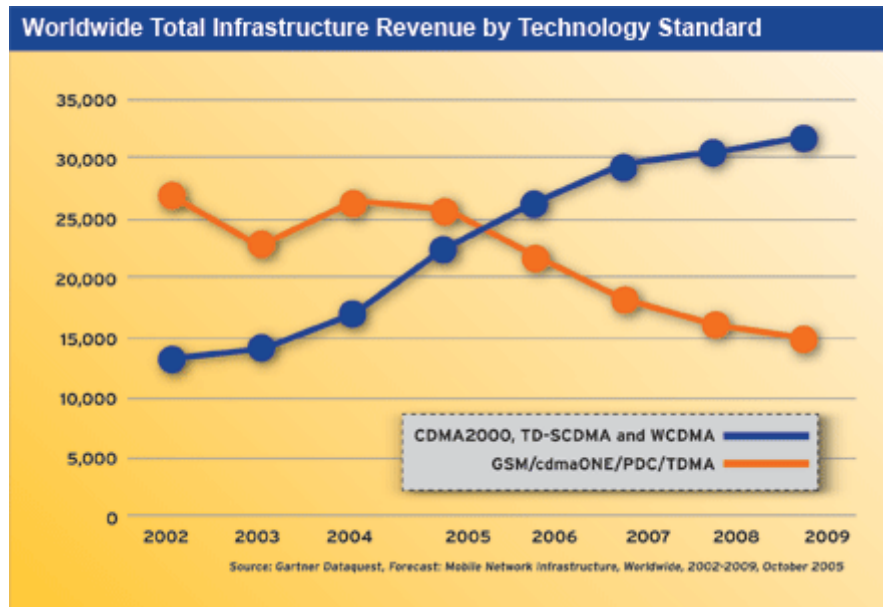
Figure 1

3G now has over 350 million subscribers worldwide, and more than 30 million are added every quarter. By 2010, the two dominant 3G technologies, CDMA2000 and WCDMA, will account for 1.2 billion subscribers. In the past six years, nearly 300 operators worldwide have deployed 3G systems. This trend is expected to continue well into the next decade.

With the wide scale deployment of 3G technologies, Enterprises are now able to utilize seamless Wireless Wide Area Network (WWAN) to access various forms of mobile data applications that take advantage of the higher bandwidth. Measurable benefits to an Enterprise business such as improved cash flow, increased service calls per day and reduced inventory loss are just a sample of the positive tangible impact of implementing mobile data solutions.

6. MC70 Features:

The flagship MC70 Enterprise Digital Assistant (EDA) is a rugged handheld mobile computer that incorporates a mobile phone, PDA, computer, scanner or imager in a single unit designed for the rigors of all-day, everyday usage. It uses an industry leading innovative mechanical design and technology platform and offers superior construction and expandability, delivering outstanding investment protection and a low TCO. Engineered to withstand rigorous use in extreme environments and working conditions, the MC70, including internal WLAN and external WWAN capabilities, can endure multiple drops, a wide range of temperatures, moisture and dust, and still deliver reliable performance.

This compact, lightweight (11.2 oz) device combines state-of-the-art multi-mode wireless networking, voice and data communications, and advanced data capture in an Enterprise productivity tool that can support nearly any application in any environment, inside or outside the Enterprise. Its technology platform uses the latest mobile processor technology to deliver desktop-like performance to Microsoft's latest mobile operating

system. The MC70 has a full suite of data capture options, from bar code scanning and signature capture to image and credit card processing, thus enabling real-time data applications that automate and error proof the Enterprise's field service business processes. As such, it is the ultimate anywhere, anytime business tool.

For workers outside the Enterprise, support for eGPRS (EDGE)/GSM and CDMA 1xEV-DO networks delivers global coverage, fast wireless data speeds, and Enterprise level security. Inside the Enterprise, the MC70 connects to the wireless LAN for voice and data communications, providing better control over wireless WAN usage and costs. Furthermore, wireless PAN functionality, via Bluetooth, increases employee productivity through wireless connectivity to a variety of peripherals.

7. MC70 EDA Benefits to Enterprise:

The capabilities of wireless broadband networks allow Enterprise CIOs and IT managers the freedom to design and implement more compelling and richer Enterprise applications and functionality. CIOs and IT managers also appreciate that the security mechanisms (authentication, authorization and encryption) of 3G networks are optimized to handle Enterprise mobile user requirements.   Therefore, CIOs and IT managers have concluded that the robust design of 3G systems allows them to provide remote access to desktop equivalent applications anywhere and at anytime, creating new opportunities in customer support services and enhanced channel development structures.

To manage the deployment of mobile devices, Symbol has developed the Mobility Services Platform (MSP) which is an integrated solution that provides unified Enterprise-wide management of mobile devices and wireless network infrastructure. With MSP, Enterprises can accelerate the rollout and deployment of mobile devices across the Enterprise, remotely monitor the health/performance of the devices and expedite the resolution of problems.

MSP simplifies and reduces the cost of managing the Enterprise's mobility solution with anywhere, anytime end-to-end visibility and control of all mobile devices, mobile applications and wireless infrastructure. This scalable solution is ideal for any size environment and the single management system provides the flexibility to support the Enterprise's heterogeneous mobility solution - a single management system that supports all Symbol wireless infrastructure and mobile devices.

8. Conclusion:

Mobility is a key driver in the productivity evolution of the Enterprise market segment. CIOs and IT managers are realizing the essential competitive impact of providing remote access to desktop equivalent applications anywhere, anyplace at anytime. As the managers of an Enterprise's network, CIOs and IT managers have a major investment in the new hardware/software, devices and wireless mobile service solutions they plan to deploy throughout their organizations.

The wireless broadband network, as deployed by carriers around the world, is the best technology solution to meet the demanding remote/mobility requirements of today's Enterprises. The open and flexible all-IP based architecture of their 3G networks allows

for simple integration into an existing Enterprise remote/mobility solution, and improves Enterprise efficiency and workforce productivity by addressing all standard platforms. In so doing, mobile Enterprise customers can merge traditional inside-building applications with in-field/remote functionality. Carrier-based wireless broadband technology captures the true essence of ubiquitous desktop productivity away from the office environment.

The MC70 EDA is a tool that is optimized for Enterprises to take advantage of the opportunity that carrier-based wireless broadband technology offers to their mobile workforces.