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White Paper

Enterprise mobility — It's more than connecting on the go.

The new Nortel vision of mobility redefines the possibilities for communication and collaboration in dynamic, distributed enterprises.

It's a surprising but very real statistic: 50 to 70 percent of office space is unoccupied during normal business hours (International Telework Association and Council). Where are these people? Some are elsewhere in the building or visiting another company site. Others are working at home or on the road. With the widespread adoption of telecommuting, wireless and various other "virtual office" technologies, this trend will only increase. How can companies ensure that time and distance do not become barriers to productive collaboration?

What's the best way to enable geographically dispersed teams to work together in ways that are natural, convenient and effective?

Ever since the adoption of the cellular phone in the 1980s, and the surge in wireless everything in the '90s, businesses have answered these questions with various "mobility" technologies, such as in-building wireless LANs and cellular phone service. But as we take stock, halfway through yet another decade, enterprises have only scratched the

surface of the ever-expanding possibilities. As key standards and technologies mature and new innovations reach the market, it's time to raise the bar on what constitutes *real* mobility for the dynamic, distributed enterprise.

Enterprise mobility must make network boundaries invisible to the user.

Some vendors would have you believe that if you can wander around the premises with your laptop or PDA, you have arrived... or that mobility is achieved if you simply have wireless communications of some sort.

But in reality, this is far too narrow a definition. Sure, wireless communications enable people to get away without losing touch, but is the wireless device the only way your users want to connect when away from their desks? Chances are, even guests in your own conference rooms or visitor offices are offered only wired Ethernet access to the Internet.



Enterprise mobility should extend seamlessly beyond the boundaries of your company's buildings. Users should be able to roam across town, on the road, or around the world — anywhere within the reach of a LAN, MAN or WAN. And users should be able to connect in many ways when they are away from their offices — such as via wireless LANs (WLANs), from an Ethernet jack in a hotel room over DSL or cable modem connections from home, or someday with WiMax.

Enterprise mobility should be more than just having some way to connect when you're away.

Today, people carry a host of portable communication devices — laptops, pagers, PDAs, multi-mode cell phones, two-way radio phones, etc. That's fine and well if you don't mind juggling a smorgasbord of electronics. Just watch business travelers unloading their pockets and briefcases at airport security, and it's easy to see that we've traded some inconvenience for convenience.

Enterprise mobility should be about more than discrete mobile services. It should be more than carrying a device for e-mail and Web access, another for voice calls and another for urgent alerts. Mobility should capitalize on unified applications and multi-purpose access — enabling users to not just connect, but fully *engage*, from afar. A consistent, quality user experience requires converged business applications that users can easily access in many ways — both wired and wireless.

Enterprise mobility must be secure everywhere.

It does seem like a paradox; the very openness that makes mobility applications useful would seem to make them equally vulnerable. You need free and easy flow across unsecured environments

— yet stringent protections against unauthorized or malicious access.

Enterprise mobility can resolve these challenges with a full array of security solutions that are easy to deploy and inter-operate seamlessly with existing network components such as routers, firewalls and existing authentication mechanisms.

Collectively, these three elements point to a new model of communicating and collaborating across the dynamic, multi-location enterprise: a consistent, reliable, secure communications experience — anytime, anywhere and on whatever device you are using.

Towards a new vision of enterprise mobility

If we can embrace this broader perspective of mobility, enterprises really will achieve their stated goals of improving productivity, reaching new markets and delivering superior customer care. The technology enablers are here or on the very close horizon. Here's a sampling in the table below.

Capitalizing on these technologies, we can redefine the possibilities. Let's take a closer look at the three key dimensions of a new vision of enterprise "mobility".

Enterprise Mobility Dimension #1

Eliminate network boundaries (or at least make them invisible to users).

Real mobility must span wired and wireless domains.

The new vision of mobility encompasses three classes of bandwidth:

- > **Wired** bandwidth to the user's desktop, enough bandwidth to support high-speed Internet access, IP Telephony and multimedia applications
- > **Wireless WAN** bandwidth, available just about anywhere, embracing enterprise WLANs, public WLAN hotspots, campus and metro wireless mesh networks and 2G and 3G public wireless services
- > **Nomadic** bandwidth — a combination of wired and wireless options — for occasional, on-demand use by out-of-office users, who may be at home, in a hotel or at enterprise and public WLAN hotspots

Edholm's Law of Bandwidth observes that bandwidth in each of these categories increases over time yet retains a constant relationship (Phil Edholm, *IEEE Spectrum*, July 2004). The major implication is that the more plentiful

Mobility-enabling technologies	Examples
Proliferation of mobile devices	Smart cell phones, integrated PDAs, laptops, tablet PCs, WLAN phones, dual and tri-mode phones
Wireless LANs	WLANs, wireless mesh networks, WiMax
2G and 3G public wireless networks	CDMA2000, 1xEV-DO, EDGE, UMTS
Broadband Internet access	Ethernet, DSL, cable modem
Security technologies	SSL, IPsec, user authentication
Session Initiation Protocol (SIP)	Point-to-point and conferenced multimedia sessions with presence and personal agents

Table 1. Enabling technologies

and economical bandwidth becomes, the more applications naturally migrate from the desktop to mobile campus workers, teleworkers and road warriors.

To be useful though, basic connectivity for these applications must be natural, convenient and simple for end users, whether they are connecting on wireless or wired devices. This ideal capitalizes on the growing trend toward devices that have multiple connectivity options, such as public wireless/WLAN dual- and tri-mode operation, wired Ethernet and even dial modem in a single device.

At Nortel, we're already making it as simple as possible to use these different modes for wired and wireless connectivity. For the path of last resort — dial modems — a method is provided that makes it easy to select the most cost-effective number to call based on dialing phone number.

The goal is a seamless experience that transcends traditional network boundaries. Users can roam from floor to floor in a building or campus, across the city and around the world. Wherever they roam, they enjoy non-disruptive voice, data and multimedia sessions, with little or no noticeable impact as they move around or cross networks. Dynamic network analysis transparently determines the most applicable connection point for data, voice and multimedia sessions.

You can achieve this ideal in progressive stages.

The first step toward this goal is a scenario whereby WLAN data and IP Telephony users can roam across subnet boundaries in a campus environment. IPsec mobility uses IPsec VPN sessions/tunnels that support a persistent IPsec connection. The connection doesn't "break" when the user roams between enterprise WLANs, WLAN hotspots and public wireless services.

The next step comes with the emergence of dual-mode wireless smart phones and voice-enabled PDAs — complementing public wireless and WLAN capabilities. When loaded with IP Telephony or multimedia clients running over IPsec VPNs, these devices will enable on-premises users to set up and receive sessions over the public network or an enterprise WLAN.

The final step is for seamless WLAN/public wireless roaming services based on IP networking and Session Initiation Protocol (SIP). With this approach, enterprises can either use their own IP Telephony or unified communications system or subscribe to a hosted offering from a service provider.

On the wired side, true mobility embraces IP Telephony to simplify and enhance the user experience across network domains, enable new levels of convergence and profoundly change the way employees, partners and customers communicate.

**Enterprise Mobility Dimension #2
Provide a consistent, high-quality user experience.**

Unified communications simplify today's patchwork of devices and services.

Mobility today is delivered in a highly fragmented world of multiple devices, multiple phone numbers, multiple mailboxes, multiple security procedures, device-dependent interfaces and disjointed communication applications (such as telephony, IM and conferencing). This scenario is further complicated by the proliferation of mobile devices, ranging from smart phones and PDAs to tablet PCs and laptops, running under a handful of different operating systems.

The new vision of mobility establishes a consistent quality of experience across these various devices, with "unified" communications that:

- > Integrate presence across a broad range of activities and user devices, such as phones, PCs, laptops and PDAs
- > Converge asynchronous communications (such as e-mail, voice mail, short message services) and synchronous communications (such as IM, voice, video and application sharing)
- > Enrich mobile communications with voice and multimedia capabilities

"Engaged" applications redefine the possibilities for collaboration and customer care.

With the attributes of unified communications in place, applications can engage, not just connect. The network can deliver critical and time-sensitive information precisely when, where and how users need it. For example, imagine your customer support center being able to locate and engage the specialist that can best meet the client's needs, drawing on a geographically distributed pool of specialists. Imagine a supply chain management application that brings the right people together — anytime, anywhere — to resolve a supply or delivery issue. Or a collaboration application that makes it easy for dispersed creative teams to spawn new innovations.

The pivotal glue for this vision is SIP — a signaling and control protocol for initiating sessions between and among users, regardless of the media being used. SIP enables communications sessions to understand and preserve "presence" — attributes associated with a person's location or activities. When SIP is embedded in business telephony, users can connect over any device — anytime, anywhere.

Here are some other examples of unified communications available today or being rolled out:

- > Speech-activated voice mail, e-mail and fax handling by phone. Hands-free access to messages allows mobile workers to remain productive while away from the office.
- > Web-based messaging and personal mailbox administration. Users can access messages and manage their personal mailbox from any Internet browser.
- > Voice portals. Hands-free access delivers any information on the intranet, including pricing, supply, product and financial data.
- > Speaker verification/passwords provide hands-free user authentication or another level of security.
- > Access to Web portals from public PCs (no client software required) provides unified mail retrieval; voice mail, fax and e-mail handling; booking and handling of conference bridges; and multimedia collaboration with personal call routing rules.
- > Location services offer location-based authentication and privileges, location-based presence and I/O management (such as using a PDA to control display of detailed images on a nearby high-resolution monitor).

Applications such as these make it intuitive and easy to use mobility applications — applying technology to drive ever closer to recreating the in-person experience.

Uses are not just connected and engaged. They're in control.

The frenetic culture of the Internet Age brainwashes us to believe that we must be constantly available to everyone, all the time. The notion is that collaboration and connection must be instant, on demand — or else productivity will suffer. In reality, this kind of never-ending connectivity can stifle the very productivity it purports to create. When employees can be interrupted at any time, gone is the focused opportunity to research and reflect, conduct private meetings with important clients and dedicate one's focus to the task at hand.

Where mobility does have the potential to over-run its users, our vision of mobility gives users dominion over exactly how and when their communications follow them and when they leave them alone.

End users enjoy a high degree of control as to how their presence is communicated (or hidden), and how incoming sessions are handled — based on caller, media used, time of day and ultimately even on location. They have tremendous flexibility to customize their communications to suit their work requirements, schedule and preferences.

With our vision of unified communications, users have a single control panel from which to access directory information, launch and/or receive multimedia sessions, participate in multi-party calls, initiate IM or application sharing sessions, track the availability of coworkers (via presence) and manage their availability (via personal agents).

IT managers need to easily manage the basic infrastructure and unified services. In our vision, IT departments can opt to tightly control their own mobility environments or take advantage of hosted and managed services, at either the infrastructure or communications levels or both.

The business as a whole requires control to be highly adaptive — with the ability to assign variable levels of mobility to different functions and people. For example, you might need mobility to be associated with a function (say, first-shift ICU nurse, station B) rather than a person. The designated staff member would inherit the mobility profile when picking up the mobile device at the start of the shift. Physicians within the same environment probably need more permanent designations, plus wide-area mobility that gives them coverage and “follow me” services as they travel from their offices to diagnostic clinics to hospital rounds.

Enterprise Mobility Dimension #3 Provide secure, private access for authorized users.

Threats come in various forms and can infiltrate the enterprise environment across any physical or logical port, inside the enterprise or in the public network. WLANS especially have known security exposures.

But you don't have to be vulnerable. The Nortel vision of enterprise mobility makes security intrinsic to all applications and services, into the very DNA of the network — wired or wireless, in the office or remote, for data or unified

The Nortel vision of mobility transforms the enterprise by integrating business applications into a real-time, unified communications fabric.

The Nortel vision for enterprise mobility encompasses both wired and wireless connectivity, private and public networks, data and unified communications — all adaptable to the needs of end users, IT and the business as a whole.

communications. When you complement these security mechanisms with sound security policies and best practices, you can effectively safeguard the privacy and integrity of mobility applications.

The process begins with user ID/password authentication to verify user identity. Where confidentiality is critical, enterprises can opt for two-factor authentication, which usually requires a combination of something the user knows (such as a password) and something the user possesses (such as a physical token Secure ID card). In high-security environments, there's even three-factor authentication that includes a biometric, such as an eye scan or voice recognition.

Then add access control and auditing, encryption, firewalls, key management, adaptive tunneling tailored to the application, application-aware bandwidth management and Quality of Service (QoS). Virtual private networks (VPNs) enable secure access for individual remote users without requiring dedicated pipes.

The Nortel strategy includes universal access portals that seamlessly support Secure Sockets Layer (SSL) security (in clientless, enhanced, network-level and client-based modes) and client-based IPsec-based VPN remote access for data and voice/multimedia traffic. By using a friendly interface, users do not see this taking place in the background and no longer need to be technical or aware of the networks around them.

Work becomes something you do, not somewhere you go.

In summary, the Nortel vision for enterprise mobility provides technology solutions for the three key dimensions:

1. No network boundaries

- **Wired and wireless** — Natural, convenient and simple access spanning wired, wireless and nomadic bandwidth classes
- **Anywhere, anytime** — Non-disruptive voice, data and multimedia sessions, even as users roam across network boundaries

2. Consistent, high-quality user experience

- **Unified communications** — A consistent quality of experience across various portable devices
- **Engaged applications** that capitalize on SIP to uniquely personalize and customize the experience
- **Adaptable control** — Satisfying the management and control needs of end users, IT and the enterprise

3. Security everywhere

— Comprehensive protection for mobility applications, users and the network itself

Collectively, these three dimensions transform the way business gets done. Seamless mobility solutions will deliver voice, data, video and multimedia applications — when and where you need them. People will enjoy a consistent, reliable, secure connected experience, no matter where they are or what they are

doing. Converged applications will enable remote employees to be as present and productive in the extended “virtual workplace” as their colleagues in the office.

The bottom line.

“So,” you may be asking, “This vision can potentially accelerate decision-making, make team initiatives more successful and increase customer satisfaction. That all sounds very nice, in a Utopian way, but can our company afford to implement this new technology?”

You almost can't afford not to. For one, whether or not your organization embraces the agility and performance advantages of mobility, chances are, your competitors will. But you don't have to cost-justify the solution on fears and what-ifs; the hard benefits are self-evident. When you equip mobile users with unified communications they can really use, you will:

- > Eliminate costs for second phone lines for workers based in home offices
- > Substantially decrease charges for long-distance, 1-800, calling card and cellular services
- > Dramatically reduce per-minute charges for audio-conferencing, if you presently outsource this to a service provider.

We know the business case well, because we took advantage of it for ourselves. Nortel equipped more than 7,000 mobile employees with multimedia clients for their laptops. Now, rather than using traditional phone services, these users

can securely access corporate voice and data applications over DSL and cable modems from home, and use wired or wireless Ethernet connections from hotels, airports or WiFi hotspots.

As a result, we dramatically reduced calling card, long distance and telephone charges: by 52 percent for executives, 42 percent for sales representatives and 90 percent for telecommuters. By IP-enabling our PBXs and adding IP applications for unified communications, our IT group repaid its investment in only eight months. When we added an in-house audio-conferencing solution to the mix, we got 100 percent payback in only four months.

Conclusions

The Nortel vision of enterprise mobility redefines the way users' needs are met by networking technologies — and will profoundly change the way organizations communicate.

Who better to drive this vision than Nortel? We already provide mobility applications for more than 160 million users — with more than 100,000 wireless base stations deployed. More people use our secure remote access clients than anyone else's: more than 60 million worldwide. We were first to market with all three advanced cellular technologies — GPRS, CDMA 2000 and UMTS; a

leader in WLAN mesh networking; and first to offer an enterprise-scale, open-standard SIP multimedia solution. We are active contributors in shaping industry standards, and we are building wireless networks for the world's leading operators.

In addition, we are aligning with industry leaders to offer a portfolio of wireless phone devices, and to ensure that consistent security and unified communications soft clients are available for the most common operating systems.

To find out more about how Nortel is redefining the possibilities for enterprise mobility, visit us on the Web at www.nortel.com.

In the United States:

Nortel
35 Davis Drive
Research Triangle Park, NC 27709 USA

In Canada:

Nortel
8200 Dixie Road, Suite 100
Brampton, Ontario L6T 5P6 Canada

In Caribbean and Latin America:

Nortel
1500 Concorde Terrace
Sunrise, FL 33323 USA

In Europe:

Nortel
Maidenhead Office Park, Westacott Way
Maidenhead Berkshire SL6 3QH UK

In Asia Pacific:

Nortel
Nortel Networks Centre
1 Innovation Drive
Macquarie University Research Park
Macquarie Park NSW 2109 Australia
Tel: +61 2 8870 5000

In Greater China:

Nortel
Sun Dong An Plaza
138 Wang Fu Jing Street
Beijing 100006, China
Phone: (86) 10 6528 8877

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For more information, contact your Nortel representative, or call 1-800-4 NORTEL or 1-800-466-7835 from anywhere in North America.

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