



## Solution Brief

### Nortel CDMA 1xEV-DO Rev A

#### *Clear choice for mobile broadband*

Nortel has delivered evolution with time-to-market advantage for service providers since the inception of CDMA based on the IS-95 standard, gracefully evolving to CDMA 2000 1X, then to 1xEV-DO Release 0. 1xEV-DO Revision A is the most recent evolution step that brings true mobile broadband experience to users with real-time services like mobile VoIP and video.

#### What is 1xEV-DO Rev A?

Approved by 3GPP2, 1xEV-DO (EVolution – Data Optimized) Revision A is the next step in CDMA 1xEV-DO Rel 0 evolution. Backward compatible with Release 0, 1xEV-DO Rev A uses the same channel bandwidth of 1.25 MHz over the air to further enhance the user experience. Higher data rates in both the downlink and the uplink of up to 3.1 Mbps and 1.8 Mbps, respectively, improve the average user data rate by about two times. Users are enjoying average speeds of 600-1400 kbps downlink and 350-800 kbps uplink.

Quality of Service (QoS) is the mechanism by which the applications can specify the type of packet treatment. This results in the optimal performance for several different types of applications that are delay-sensitive (voice), rate-sensitive (streaming) and best effort (web browsing).

1xEV-DO Rev A is designed specifically for packet data, and its structure and features are architected to deliver IP-based applications. With the ability to handle higher bandwidth and lower latency, 1xEV-DO Rev A with QoS is leading the industry in enabling delay-sensitive applications such as VoIP, PTx (Talk, See, IM), Video Telephony and other multimedia applications.

An all-IP 1xEV-DO architecture allows any operator to leverage its existing IP network and build one converged IP network rather than deploying two separate networks supporting circuit-switched and packet data services. This provides not only potential cost savings and investment protection but also a platform to integrate or launch enhanced services.



## Nortel's industry-leading 1xEV-DO Rev A solution

1xEV-DO Rev A delivers a rich wireless broadband experience along with the freedom of mobility with data rates similar to most DSL or cable modems in the residential broadband market.

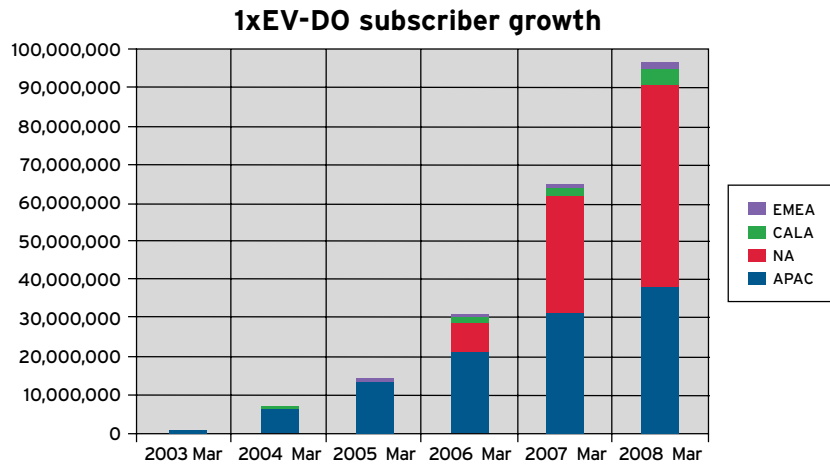
Nortel's 1xEV-DO portfolio provides service providers with a solution that not only drives operational savings and increased capacity but also generates new revenue streams with an enhanced user experience and new applications. The market demands a set of solutions that are highly cost-effective, support open architectures, and most of all, have a roadmap to packetized enhanced communications. 1xEV-DO Rev A does just that and Nortel was the first vendor to deploy this solution in several markets around the world and leads the market with the highest number of deployments globally (Source: CDG).

1xEV-DO popularity has experienced phenomenal growth globally at a rate of 64 percent in 2007 to 90 million 1xEV-DO subscribers. The first quarter of 2008 alone saw a growth to 97 million 1xEV-DO subscribers.

Nortel's CDMA 1xEV-DO Revision A solution is comprised of the following key nodes:

- **Base Transceiver Station (BTS):** Covering frequencies from 450 MHz to 2.1 GHz for flexible deployment options that support 1xEV-DO Rev A with single card upgrade with DO Module A (DOM-A)
- **DO Radio Network Controller (DO-RNC):** One of the highest capacity Radio Network Controllers in the field today with the ability to cluster multiple RNCs for an even higher scalability and subnet capacity while providing capacity addition — a very simple process, saving the costs

Figure 1. Global growth in 1xEV-DO subscriber count (Source: CDG)



of having to re-engineer the network as capacity grows

- **DO Element Manager Subsystem (DO-EMS):** Network management has been developed with more than a decade of wireless experience from CDMA commercial networks that allows service providers to monitor, manage and optimize the network for best performance while providing significant operational savings

## Nortel 1xEV-DO Rev A enables real-time revenue-generating applications with Quality of Service (QoS)

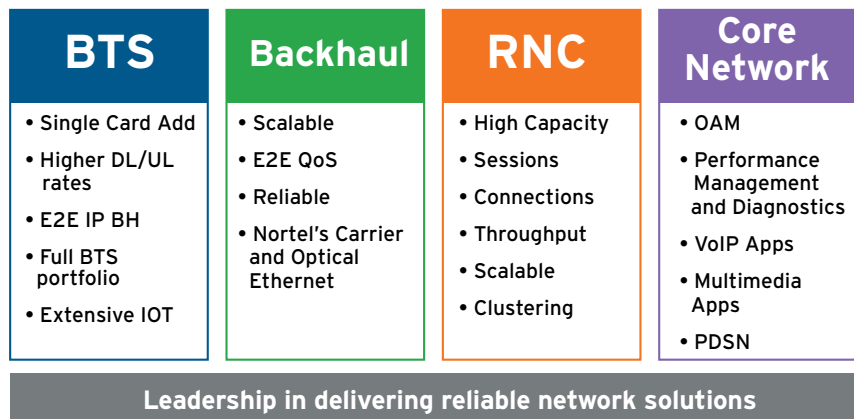
Nortel's QoS mechanisms enable each application to specify the packet treatment that will result in the best

performance for that application. This is achieved by mapping application packets to one of the traffic "flows". Each flow is optimized per different performance requirements suitable for types of the packet. Each packet gets exactly *what* it needs, *when* it needs it.

The QoS RLP flows and prioritization are as follows:

- **Delay Sensitive (DS):** Carries packets requiring minimal delay (audio bearer)
- **Application Signaling (AS):** For signaling of all delay-sensitive applications
- **Rate Sensitive (RS):** Supports the video streaming application
- **Best Effort (BE):** Supports all other packet data applications

Figure 2. 1xEV-DO Rev A made simple



## Real-time applications enabled by Nortel 1xEV-DO Rev A

The emergence of 3G mobile broadband networks, standard protocols and advanced mobile terminals has made wireless voice and multimedia applications a reality. With Nortel 1xEV-DO Rev A, operators will be able to introduce these advanced multimedia services over all-IP networks. Nortel has been actively engaged in integrating and optimizing the solution set and applications with customer trials to accelerate the deployment and launch of real-time applications such as Mobile VoIP, PTT, See What I See (Push-to-See) and Mobile Video Streaming, driving new streams of revenue for service providers.

### Push to X: Push-to-Talk, Push-to-See

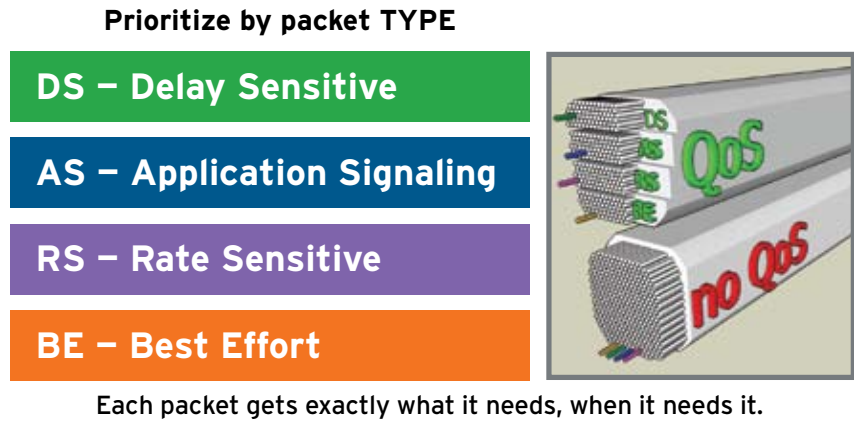
Nortel's 1xEV-DO solution delivers a sub-one second average push-to-beep high performance Push-to-Talk application. Other types of packet voice applications will also have the benefit of short call setup time.

With the Push-to-See application, the end-user experience is further enhanced as they can also transmit and receive video, not just voice. The high bandwidth of Nortel 1xEV-DO Rev A on both the forward and reverse links, in conjunction with the QoS functionality and SIP header compression optimization, allows this type of real-time application to be delivered with higher quality and performance for enhanced Quality of Experience.

In addition to PTT/PTSee, Nortel has also leveraged our carrier-grade SIP Application Server, the Application Server 5200, for delivering mobile VoIP solutions over 1xEV-DO Rev A.

Nortel 1xEV-DO Rev A contains the following features to deliver high-

Figure 3. QoS enables different types of traffic to share the resources



performance VoIP and Push-to-X applications, such as Push-to-Talk.

- Data over signaling in both uplink and downlink
- Higher access channel capacity
- Enhanced Idle state
- Multi-flow RLP QoS including rate sensitive (RS) and multiple delay sensitive (DS) flows
- SIP header reduction

### Video Telephony and Video Chat

Telephony is a point-to-point application that allows two-way video-enabled communications between participants. Nortel DO Rev A enables Video Telephony with QoS flows for delay-sensitive voice packets and for rate-sensitive video packets. The enhanced uplink capacity of 1.8 Mbps will facilitate two-way interactive video streams. Video Telephony becomes a reality in the wireless environment with Nortel's 1xEV-DO Rev A and QoS solution as it takes advantage of the increased bandwidth capacity that is required on both the uplink and downlink air interface and lower latency for a quality end-user experience. Video Chat is an extension of the Video Telephony that allows multiple participants to be connected with each other in a video conference. To date, Video Conferencing has traditionally

been confined to an enterprise, wired application. However, with Nortel's 1xEV-DO Rev A solution, operators can target mobile consumers and enterprise users and leverage this application for higher ARPU. An example of targeting this application for mass market appeal is a video chat portal, with chat rooms dedicated to specific interest topics (e.g., news, politics, religion, movies).

### Video Services: Mobile TV and Video on Demand

Nortel 1xEV-DO Rev A provides an ideal platform for delivering Video Services by providing Quality of Service and increased peak data rates. In addition, Nortel's 1xEV-DO Rev A IP network enables a seamless migration path for video services leveraging IMS enablers and functionality such as presence, common subscription and billing. Convergence across different services (video and non-video) improves the end-user experience. Like voice,



Nortel's wireless deployment leadership, combined with Nortel's leadership in delivering Carrier VoIP and Multimedia applications, provides an enhanced solution set that enables operators to successfully launch a 1xEV-DO Rev A network delivering applications to retain and capture high ARPU users and realize incremental revenue today.

video is intuitive so ease of use and content richness drives adoption. Using common enablers will deliver a more intuitive, easier to use end-user experience. In addition, Nortel 1xEV-DO Rev A provides enhanced downlink peak data rates up to 3.1 Mbps and the "rate sensitive" QoS flow to ensure better Quality of Experience.

### Nortel 1xEV-DO leadership

Nortel, with a superior 1xEV-DO Rev A solution, is the leader in providing mobile broadband solutions to operators around the world.

- World's #1 in global CDMA 1xEV-DO commercial deployments (Source: Informa, March 2008)
- Nortel has a strong #2 CDMA infrastructure market share globally (Source: Informa, March 2008)
- More than 12 years of global commercial deployment experience delivering customized CDMA solutions
- 200+ networks deployed globally

- VoIP leadership – #1 in Carrier VoIP for last 6 years (Source: Dell O'ro)
- First to demonstrate wireless broadband "Triple Play" of simultaneous voice, video and gaming via live 1xEV-DO
- First VoIP call over EV-DO Rev A and first Video Telephony call over EV-DO Rev A
- World's first 1xEV-DO networks commercially deployed in South America, Central America and in Europe
- World's first 1xEV-DO network in 450 MHz

### Nortel continues to lead the CDMA 1xEV-DO solution with unique differentiation proven in the market

- **Investment protection and graceful migration to 1xEV-DO Rev A:** With only a single card addition to an existing CDMA base station for enabling Rev A
- **Time-to-market advantage:** The first deployment of 1xEV-DO Rev A in a commercial network

- **Diverse BTS portfolio supporting 1xEV-DO Rev A:** With flexible deployment options and features, and hardware that makes the network environment friendly while saving costs for service providers
- **Higher capacity DO network:** One of the highest capacity DO-RNC networks in the field today along with unique capabilities to cluster multiple RNCs for further scalability
- **True E2E all-IP solution:** Support for flexible backhaul options and interfaces including T1/E1 and 10/100BaseT Ethernet
- **Superior performance:** With advanced RF and network features that provide industry-leading capacity, coverage, mobility, handoffs and load-balancing techniques
- **Solid evolution path to the next-generation mobile broadband access – Long Term Evolution (LTE)**

Nortel is a recognized leader in delivering communications capabilities that make the promise of Business Made Simple a reality for our customers. Our next-generation technologies, for both service provider and enterprise networks, support multimedia and business-critical applications. Nortel's technologies are designed to help eliminate today's barriers to efficiency, speed and performance by simplifying networks and connecting people to the information they need, when they need it. Nortel does business in more than 150 countries around the world. For more information, visit Nortel on the Web at [www.nortel.com](http://www.nortel.com). For the latest Nortel news, visit [www.nortel.com/news](http://www.nortel.com/news).

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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