



***Motorola CDMA Network Evolution –  
Executive Summary***

*May 2004*

## Where We Are Today

Evolution towards an All-IP architecture has become the goal for 3G wireless networks, and with good reason. IP-based systems offer significant advantages to operators and subscribers, from connectivity across a variety of devices, networks and protocols, to greater flexibility in the management, use and cost of network resources. Motorola wireless solutions are exploiting these advantages to provide higher performance, cost effective and reliable cellular infrastructure products today. More important, we are committed to the evolution of All-IP network technology, and to solutions that will deliver even more advantages to our customers tomorrow.

The term "All-IP network" refers to a network in which all the components use IP protocols to provide transport for all types of bearer and signaling information. However, "All-IP" also describes a Multi-Media Domain (MMD) network concept in which service intelligence migrates to servers and mobile devices at the network edges. Three technologies must be provided to supply full MMD capability: IP transport (in the RAN, in the core networks and at the interface between the two), standardized SIP call control (in the infrastructure and in the handsets), and IP Multimedia Subsystem (IMS) servers and applications.

Motorola's approach to "All-IP" encompasses both ubiquitous IP transport and MMD. Motorola's RAN is founded on IP and, through the standardization process we are working to remove its last element of circuit-based technology – the interface between the RAN and the core. Our new MSS-C softswitch is internally based on IP technology and is positioned to support IP-based communications throughout the core network. We are also moving toward support of MMD architecture. Our softswitch already provides a key aspect of this architecture, the separation of bearer and control functions. We have demonstrated the SIP-based call control in MSS-C and are rolling out MMD style applications such as Push-To-Talk over Cellular and Multi-media Messaging Services that can be implemented within today's architecture. Meanwhile, we are working both in our labs and through industry standards committees to define the needed QoS enhancements for the RAN to make the full All-IP MMD vision a reality.

## Intermediate Migration

For CDMA networks, the standards that define the support architecture for MMD are largely being imported from 3GPP UMTS standards. However, the transformation of the current CDMA network to a full MMD architecture cannot happen overnight. Intermediate changes in the air interface offered over this interface will concern operators.

**CDMA2000 1xEV-DO (1X Evolution Data-Only)** wireless technology introduces a new air interface with a peak data rate of 2.4Mbps and an average throughput of about 600 Kbps on the forward link, providing operators with up to three times more data capacity than current CDMA2000 1X networks. 1xEV-DO is optimized for the bursty, high-speed, broadband access characteristics of the Internet Data Model. Enhancements to the 1xEV-DO standard, referred to as Revision A, increase data speeds, reduce latency and provide QoS mechanisms making the standard viable for real time applications such as Voice over IP.

**CDMA2000 1x EV-DV (1X Evolution Data-Voice)** provides support for voice, mixed voice/data, dedicated data and real-time two-way services on a single carrier. The ability to support simultaneous (circuit) voice and packet data sessions to the same terminal may be extremely important in establishing a smooth migration path to 3GPP2's All-IP environment.

Voice services will also see intermediate evolution on the way to the full MMD environment, and the Motorola RAN will provide support for them. The Selectable Mode Vocoder (SMV) is a breakthrough technology that provides significant capacity and quality gains on 1X CDMA systems. 3GPP2 recently completed the development of the SMV algorithm and released it for implementation. The SMV will offer CDMA subscribers superior quality while allowing service providers to increase capacity as needed. CDMA2000 Wideband Speech Codec is a new Variable-Rate Multi-Mode Wideband speech codec, offering superior wideband speech quality at data rates comparable to current narrowband speech codecs. Packet-switched VoIP, or TrFO Mobile to Mobile Calls within 1XCDMA networks, multimedia streaming (MMS), and instant messaging (IMS) are among the most prominent applications of this codec.

## The Steps to Network Evolution

The steps that migrate Motorola's network to the MMD All-IP architecture address all three requisite areas of technology--IP transport, IMS servers/applications and SIP support. Each step provides both cost savings and revenue generation.

**Step 1**--In the core network, the Motorola SoftSwitch for CDMA (MSS-C) and Media Gateway (MGW) are introduced and packet transport is fully adopted in the RAN. The goal is to cap/shrink the legacy circuit switched network domain and grow the IP based network domain. The flexibility of the Motorola solution allows the switch platform to be deployed as one unit or distributed. The distributed architecture deployment will enable operators to deploy media gateways at remote locations, and in large offices, the MSS-C can be deployed as a co-located control switch and media gateway combination. These enhancements begin the introduction of advanced applications and services.

**Step 2**-- Motorola will add more advanced network components and features, further shrinking the legacy circuit switched network domain and growing the IP-based network domain and enabling complete end-to-end IP transport of both bearer and signaling data. The key enhancements are support of IOSv5.0/TrFO (Transcoder Free Operation), RTO (Remote Transcoder Operation) and SIGTRAN, the introduction of IP Multimedia Domain (MMD) servers and applications, and the introduction of support for the 1X EV-DV. Motorola will also make available a suite of products with associated network services and support, including the Motorola Core Manager, standards-based Push-To-Talk over Cellular, push-to-X services, instant messaging and presence services, Motorola Global Application Management Architecture (GAMA), support of WLAN/DSL/Cable interworking, and support of advanced location services.

**Step 3**— Most enhancements in this step address the changes in the RAN that are necessary to fully support real-time MMD services such as multiple service instances at a single mobile, network initiated data sessions, and basic VoIP. Some of the standards on which the RAN enhancements will be based are not available today; however, their general requirements and the overall approach to implementing them are well understood. The inherent packet architecture of the Motorola RAN provides a significant advantage over other architectural approaches in addressing the demands of real-time MMD applications.

## Motorola's Long-Term Vision—The All-IP Based Network

Motorola's long-term goal is to evolve its CDMA network to a converged All-IP based network, from the services/applications, core network and access networks, all the way to the mobile terminals. Advanced IP-based packet switched and MMD/IMS based networks and services replace all circuit switched legacy networks. Motorola sees the industry being driven towards convergence of devices and access methods, with IP as the enabler of ubiquitous, device-and-technology-agnostic access to advanced multimedia services. The Motorola core network will evolve to link wireless, wireline and the Internet into a single core network, on a cost-effective platform that permits full asset reuse as technologies evolve. Motorola's vision includes true real-time packet voice (still the killer application), the convergence of mobility, computing and the Internet...and a dramatic new revenue source for operators made possible by delivering differentiated applications through an open, standards-based architecture and APIs.

To receive a copy of CDMA Network Evolution in its entirety, please contact your Motorola sales representative or email us at [networkoperators@motorola.com](mailto:networkoperators@motorola.com).

For further information visit:

[www.motorola.com/networkoperators](http://www.motorola.com/networkoperators)



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