The Market & Operator Challenges

The high usage of data services is transforming the wireless operator. With the transition from circuit-to packet-based traffic, wireless operators need all-IP networks that can support multimedia offerings at a lower cost per megabyte.

CDMA EVDO technology enhances the packet switched capabilities of the network. The packet-switched systems conserve resources, using network capacity (bandwidth) only when there is data to be transferred. The EVDO system implements a number of techniques that make it more compatible with high data rate packet switch networks.

With the increased data rates available on EVDO networks, subscribers get the enhanced services they want and operators have more potential for revenue. In order to meet the increasing demand for high speed services CDMA carriers will have to migrate to LTE.

CDMA service providers have several options to transition their existing networks to LTE:

- The Enhanced High Rate Packet Data (eHRPD) enables seamless migration directly from EVDO to LTE.
- Carriers may go through a phased transition period, where EVDO/eHRPD and LTE technologies co-exist, in order to optimize performance during migration.

High data rates bring new troubleshooting challenges to mobile networks and requires network operations and performance teams to identify and troubleshoot problems faster to avoid Quality of Service (QoS) problems.

As EVDO, eHRPD and LTE are deployed, it is essential to have tools that will help network operations and engineering to solve problems quickly and accurately.

Monitoring CDMA EVDO and eHRPD networks

Data services monitoring for CDMA Carriers and evolution path to LTE

What Tektronix Communications can do for you?

- Multiple departments can leverage one, integrated system to address critical EVDO and eHRPD challenges.
- End-to-End Breadth - Accelerate the isolation of problems across EVDO and eHPRD domains, from handset to content.
- User Plane Depth - Optimize the network to maximize performance based on an improved understanding of subscriber usage.
- Universal Mediation - Minimize the cost and complexity of capturing critical data for multiple business applications.
Tektronix monitoring for CDMA EVDO includes support of critical network elements and interfaces.

- **Packet Data Serving Node (PDSN)** provides access to the Internet, intranets and applications servers for mobile stations. Acting as an access gateway, PDSN provides simple IP and mobile IP access, foreign agent support, and packet transport for virtual private networking. It acts as a client for Authentication, Authorization, and Accounting (AAA) servers and provides mobile stations with a gateway to the IP network.

- **The Packet Control Function (PCF)** routes IP packet data between the mobile station within the cell sites and the Packet Data Serving Node (PDSN). During packet data sessions, it will assign available supplemental channels as needed to comply with the services requested by the mobile.

- The A10 interface carries user traffic between the PCF and the PDSN. The A10 interface uses the Generic Routing Encapsulation (GRE) protocol to provide a mechanism for encapsulating arbitrary packets within an arbitrary transport protocol for traffic delivery between PCF and PDSN.

- The A11 interface carries signaling information between the PCF and the PDSN for packet data services and provides a signaling connection between a PCF and PDSN pair (A11). A11 signaling messages are also used for passing accounting related and other information from the PCF to the PDSN. The A10/A11 interfaces support mobility between PCFs under the same PDSN.

- The A12 interface uses RADIUS protocol for subscriber session authentication, establishment and termination purposes. It is deployed between the PDSN and the Authorization, Authentication and Accounting (AAA) Server.

Simultaneously monitoring and correlating the data from the A10, A11 and A12 interfaces is the best way for the operators to detect and correct errors early in the CDMA network.

Evolved HRPD is a method that allows mobile operators to upgrade their existing HRPD packet core network using elements of the SAE/EPC architecture. Additionally, eHRPD is a more evolutionary path to LTE that allows for seamless service mobility—including seamless hand-offs—between the eHRPD and LTE networks with a single mobility management protocol. By deploying eHRPD, operators can leverage the benefit of optimized handover—no dropped sessions and reduced handover latency—between LTE and eHRPD when users cross the HRPD Serving Gateway (HSGW) boundaries.

- The HSGW ensures converged mobility management between HRPD and LTE networks. The HSGW provides interworking between the HRPD access node and the Packet Data Network Gateway (PGW).
- **A11'/A10 (eHRPD)** - Provides access between ePCF and HSGW nodes for high speed packet data services. A11’ is used for carrying signaling while A10 for carrying user and control plane data.
- **PDN Gateway (PGW)** provides connectivity from the UE to external packet data networks by being the point of exit and entry of traffic for the UE. A UE may have simultaneous connectivity with more than one PGW for accessing multiple PDNs. The PGW performs policy enforcement, packet filtering for each user, charging support, lawful interception and packet screening. Another key role of the PGW is to act as the anchor for mobility between 3GPP and non-3GPP technologies such as WiMAX and 3GPP2 (CDMA 1X and EvDO).
- **S2a (eHRPD)** - Identifies hand-over related issues between LTE and other non-3GPP networks.

Tektronix Communications’ robust applications address CDMA EVDO/eHRPD, GSM, GPRS and LTE mobile technologies with a common, industry-proven monitoring platform.

- Real-time monitoring of network health ensures proactive problem detection.
- Comprehensive troubleshooting and analysis tools accelerate problem isolation and resolution.

Flexible configuration to solve the variety of challenges facing mobile service providers, Tektronix IrisView framework simplifies network management.
Tektronix offering for monitoring CDMA EVDO, eHRPD and LTE networks

**IrisView** framework fine-tunes the GeoProbe deployments with a seamless user experience for targeted applications. IrisView flexibility accommodates a “best-of-breed” solution with optimized hardware and an overall lower total cost of ownership. Scalability is further ensured with a distributed architecture of multiple servers that can grow gracefully with probe expansions.

Tektronix Communications **GeoProbe G10** Probe is designed specifically to address high bandwidth interfaces and datacenter applications. The NEBS-compliant GeoProbe G10 platform features a distributed architecture optimized to handle high volume IP traffic with native support for both IPv4 and IPv6. The G10 serves as a primary collection and correlation agent for Tektronix Communications’ Network Intelligence solution.

**Tektronix Protocol Analyzer (PA)** allows network engineers to capture and view protocol data unit (PDU) traffic from a combination of interfaces or monitored nodes – e.g. A10/A11, A10/A11’, S2a, etc. With Protocol Analyzer users can perform real-time capture from multiple probe interfaces simultaneously and support direct troubleshooting for individual subscriber issues.

- Offering Network Engineers a composite view across mixed protocol stacks and sub-networks, PA supports both real-time and historical PDU investigation from a common platform.
- Support multiple concurrent users per probe.
- Harvest information from multiple probes into a single capture for a complete, “time-stitched” view of network activity.

By providing this capability with a common tool, Network Engineers can accelerate problem investigation and analysis efforts—significantly and reducing the mean time to repair (MTTR). The Protocol Analyzer improves troubleshooting capabilities in the CDMA EVDO and eHRPD networks.

**Tektronix Iris Session Analyzer (ISA)** leverages a proven multi-protocol correlation engine for real-time and historical trace options from a single application. Launched exclusively from the IrisView data adaptation and presentation layer, ISA provides a seamless user experience for session traces independent of the underlying probes. ISA offers:

- Complete Correlation - Full and accurate correlation over the relevant interfaces – e.g. A10/A11, A10/A11’, A12, S2a, etc of every call ensures all messages for a session are collected and presented.

Call and session trace tools are critical for Network Operations personnel to uncover and analyze the specific calls and sessions that fail to deliver required performance. Whether prompted by threshold-based network alarms or customer-escalation, call trace applications are mission-critical for network operators.

**The Iris Traffic Analyzer (ITA)** Solution is enabled by the GeoProbe G10. Designed specifically to address high bandwidth IP traffic the GeoProbe G10 is well-suited for CDMA EVDO/ eHRPD, LTE and VoIP/IMS network deployments.

With ITA, customizable dashlet views and seamless integration with other IrisView applications facilitate traffic profiling, troubleshooting and proactive end-to-end monitoring of network traffic, protocols and services, transaction latencies, and application/host bandwidth usage.

Protocol distribution dashlets enable dynamic drill-through filtering on monitored traffic based on subsequent layer selections.

As new bandwidth-demanding applications use a wide range of ports, characterizing traffic can be difficult. ITA can assist operators with the daunting task of identifying and prioritizing revenue-generating traffic.

- Leveraging the GeoProbe G10’s rich protocol identification rules and deep packet analysis capabilities, ITA automatically categorizes collected data for some of the most common applications. By identifying specific traffic based on L4-L7 identifiers, operators can track Key Performance Indicators (KPIs) for high-value managed services.
- Through careful examination of response time distribution, traffic volumes/rates, Top Hosts and Top Conversations, operators can also target areas for additional packet-level analysis and protocol signature assignment using Protocol Analyzer.
Monitor and troubleshoot critical mobile operations including accessibility and mobility.

Subscriber access and authentication to the EVDO and eHPRD networks are mission critical to driving billable usage. With IrisView, carriers can ensure that these connections are “always-on.” With subscribers constantly on the move, guaranteeing connectivity and ensuring service delivery can be complicated.

Complete Correlation and Capture of Control and User Planes

With user plane traffic accounting for 90% or more of CDMA network bandwidth use, deep visibility is needed to effectively manage capacity, optimize resources and troubleshoot performance issues. Analyze destinations and subscriber use in detail over time. Eliminate the need to recreate issues with one-click access to automatically-captured, complete user plane data and correlated call displays.

Full Subscriber-based Correlation

Tektronix Communications' unique algorithms automatically correlate permanent and temporary identifiers within and across technology domains. Maintain a complete view of each subscriber’s activity in the CDMA EVDO and eHPRD networks.