INTEGRATED NETWORK AND ELEMENT MANAGEMENT SYSTEM FOR THE 3RD GENERATION CDMA2000 WIRELESS NETWORK

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Extended Abstract

A robust and integrated Network and Element Management System cdma2000 NMS has been developed using state of the art computing technology to manage the 3rd Generation cdma2000 broadband wireless network. The architecture is based on open standards such as CORBA, SNMP, and Java, and the implementation has leveraged many commercial off-the-shelf (COTS) products and proven technologies. The cdma2000 NMS provides access to OA&M capabilities of cdma2000 network elements, as shown in Figure 1, including Base Station Controller (BSC), Base Transceiver Station (BTS), Mobile Switching Center (MSC), Inter-working Function (IWF) and Selection Distribution Unit (SDU) with a unified, integrated and web-enabled graphical presentation. It supports network topology, configuration management, fault management, and performance management. A common Management Information Base is developed for cdma2000 network elements where a common SNMP agent framework is used based on Ruby architecture (an internal Lucent effort to establish common, reusable architecture and software). The architecture adopts the semantics of the most popular TMN standards within the network elements. These concepts are being implemented as SNMP Management Information Base (MIB), i.e., for state management and alarm reporting. Interfaces to network elements or other Operations Support Systems can also be achieved easily via CORBA.

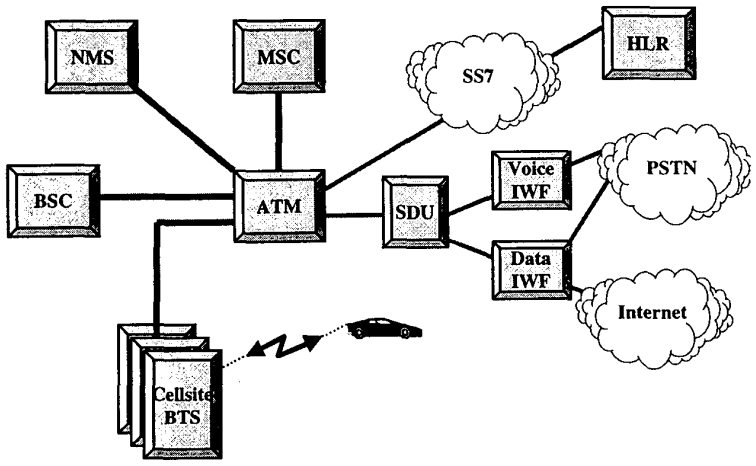

Figure 1: cdma2000 Wireless Network

The cdma2000 NMS architecture, as shown in Figure 2, is a 3-tier client/server architecture consisting of the following tiers:

- Tier 1 - the NMS Front End. This is the NMS GUI which is accessible via a Web browser or as a stand-alone Java application. Communication between tier-1 and tier-2 is by either HTTP or CORBA. Access to the NMS application through the Web provides a hardware and location independence anywhere within the secure network.
- Tier 2 - the NMS backend. This is the NMS server. All of the NMS application server processes execute from this machine. CORBA is the backbone inter-process-communication mechanism between application processes. Communication between tier-2 and tier-3 is through SNMP. Tier 1 and Tier 2 provide the manager function.
- Tier 3 - The Network Element Layer. This tier contains the network elements themselves. The NMS communicates to the network elements through SNMP. Each network element has an SNMP agent. The cdma2000 NMS system supports a heterogeneous SNMP environment capable of handling both SNMPv1 and SNMPv2c data packets. Discussion on this tier is beyond the scope of this paper.

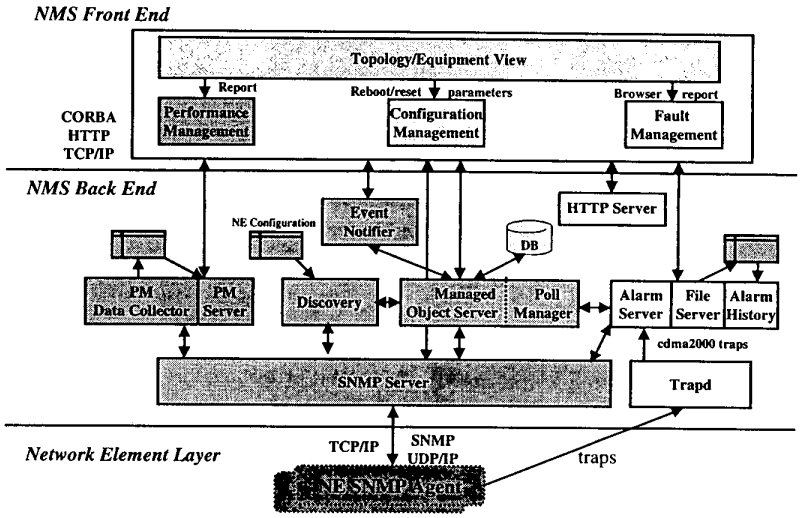

Figure 2: NMS Software Architecture

The impetus for this work was essentially two-fold: a customer trial system needed to be developed to establish Lucent's presence and expertise in the cdma2000 wireless arena and from an architectural standpoint there was the desire to move towards incorporating more industry standards and products such as, CORBA, SNMP, TMN, JAVA and WEB technologies. The justification for using these standards and products such as the items just mentioned is multi-faceted including: customers like systems that are compliant with standards, using commercially available 3rd party software often saves development time and costs by allowing the development staff to focus on the "true" application design and implementation (maybe even with fewer people), in the case of CORBA there are built in mechanisms for location independence thus allowing for potentially greater scalability and reliability.

Keyword

TMN, cdma2000, CORBA, SNMP, Java, Web-Enabled, Network Management, Element Management, Wireless Network