Solution Overview

Lucent
Lucent Technologies designs and delivers the systems, software, silicon and services for next-generation communications networks for service providers and enterprises.

Challenge
Lucent Wireless needed a Q3 adapter to interface their proprietary AUTOPLEX® System 1000 code division multiple access (CDMA) wireless Operations Management Platform with their customer's Operations Support System (OSS). The adapter was needed to mediate between the AUTOPLEX system that exposed a proprietary interface and the customer's OSS that was built using TMN standards and has a CMIP interface. Lucent engineers originally estimated a very, costly and lengthy development cycle to deliver the interface in-house. The effort and skill sets required to undertake a multi-vendor integration such as this, drove Lucent to look for solutions using external resources. Lucent decided on a team of experts from Lucent and Vertel to develop the interface.

Solution
Vertel engineers developed an architecture that would provide a Q3 interface that was simple and inexpensive. The team proposed a layered architecture that enabled various members of the team to work on specific layers of the adapter concurrently. The proposal called for an architecture that maximized the component reuse that not only shortened the initial development but also provided for simplified ongoing updates. The solution has audits features to ensure complete information synchronization and data accuracy and consistency across the interface.

Benefits
Lucent eliminated six to eight months of development by using engineers skilled in the use of TMN standards and toolkits. The design also simplified development since many components of the design were reusable. The team was able to develop the interface for less than it would have cost for Lucent to develop the solution and Lucent was able to pass the cost savings on to their customer.

Connecting systems, software and carriers

Lucent Technologies: Q3 Adapter Software for AUTOPLEX® Wireless System

Figure 1 depicts a CDMA Network Architecture that utilizes the Lucent AUTOPLEX Wireless 1000 System. This system required modification to interface with a customer's Operations Support System based on the Telecommunications Management Network (TMN) standard and required a CMIP (common management information protocol) interface. Lucent's AUTOPLEX system operates on a Solaris platform and exposes a proprietary, non-standard interface.
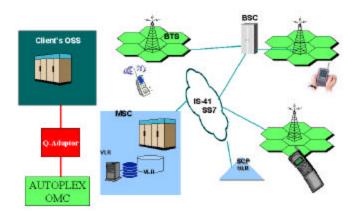
Fig. 1: CDMA Network Architecture

Vertel engineers were engaged to participate in a team effort to develop a Q adapter that could mediate the CMIP and proprietary protocol as shown in Figure 1. The team proposed a layered architecture that would enable different members of the team to independently work on parts of the development concurrently, thereby speeding up the time to market.

The layered architecture is shown in Figure 2. Vertel engineers were responsible for developing the Q adapter. The TMN Agent Persistent Toolkit was used to develop the solution.
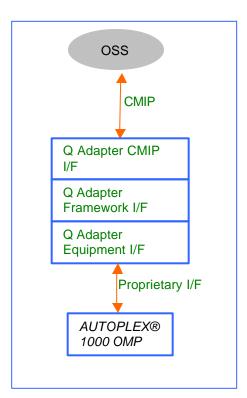
Fig 2. Q Adapter Layered Architecture

[ModelName:unsuccReqsForService] /* Performance attr*/
OperationType=GetSMMultipleCat
Category=PAF
Key=K000002
Field=C002070
Category1=CEL
Key1=K000002
Field1=C000686
NumericFormat=$1-$2

Fig. 3: An example of the flexible mapping structure

A case study about this project is published in a Bell Core Technical Journal and can be viewed at www.lucent.com/minds/techjournal/apr-jun2000/pdf/paper14.pdf

The Q Adapter also has an auditing feature to ensure accuracy and data consistency across the interface. The auditing feature ensures the quality of the adapter.

The adapter can be shut down during a network outage and restarted. The design of the adapter considered an auto update capability that would store and forward any information that was not uploaded from the OSS or the AUTOPLEX system during an outage.

In addition, the design allowed for component reuse. This sped up the initial development and enables ongoing maintenance and updates to occur with minimal, if any, disruption to the interfaces.

The Q adapter's physical architecture uses threads and queues to service multiple requests and to enhance performance. Vertel's expertise in the CDMA network architecture and with the TMN standard enabled the team to design the most efficient adapter ensuring performance at the level demanded by the telecommunications industry.

The Q Adapter also has flexible mapping of the AUTOPLEX commands to the CMIP protocol service elements and GDMO objects. This facilitates a data driven solution and ensures that small changes to the AUTOPLEX command structure will not impact the Q adapter. An example of the flexible mapping structure is shown in Figure 3.