

APPLICATION

Cellular Service Access Package

Introduction

Demand for cellular phone service has grown exponentially in recent years. Dataquest forecasts that the number of installed cell sites in the United States alone will grow to over 65,000 by 1999 — an average of 7,500 per year. The increase in demand for cellular service is driving a need for a strong cellular equipment infrastructure.

General DataComm's Cellular Service Access Package (CSAP) is a key component for cell site systems of the major cellular infrastructure equipment manufacturers. The CSAP provides an SNMP-managed interface between base station equipment and the T1 leased line telecommunications network.

Typical Cellular Network Structure

In a typical cellular network, switching centers communicate with cell sites and other switching centers through terrestrial T1 leased line circuits or, when required, microwave links (Figure 1). Cellular phones dial into a cell site and calls are passed along to land-based phone lines through the public switched telephone network (PSTN) or to other cellular phones via the closest cell site. Both cell

sites and switching centers house, among other transmission equipment, either T1 DSU/CSUs or T1 CSUs.

GDC's Solution

GDC's Cellular Service Access Package is a total SNMP-managed system where remote cell sites are configured with a SpectraComm 553 T1 DSU/CSU housed in a SpectraComm 2000 (SC 2000) low profile enclosure. At the central switching station, a SpectraComm shelf houses SC 553 units, along with a SpectraComm Manager (SCM). The SCM is the shelf controller and network management interface to GDC's SpectraComm products and enables LAN-based centralized management by acting as an SNMP shelf agent.

SNMP management operating under GDC's TEAM network management application is an effective tool for the difficult job of overseeing large cellular networks. Other management alternatives include Telnet, MIB browsers or rudimentary VT100 terminals with direct connection to the craft port of the SCM or SpectraComm 2000 enclosures.

SpectraComm 553 T1 DSU/CSU

The SC 553 is a rackmounted single channel T1/FT1 DSU/CSU providing direct access to the T1 network (Figure 2). The SC 553 supports T1 and FT1 services from 56 Kbps to 1.536 Mbps and occupies a single slot in the 16 slot SpectraComm

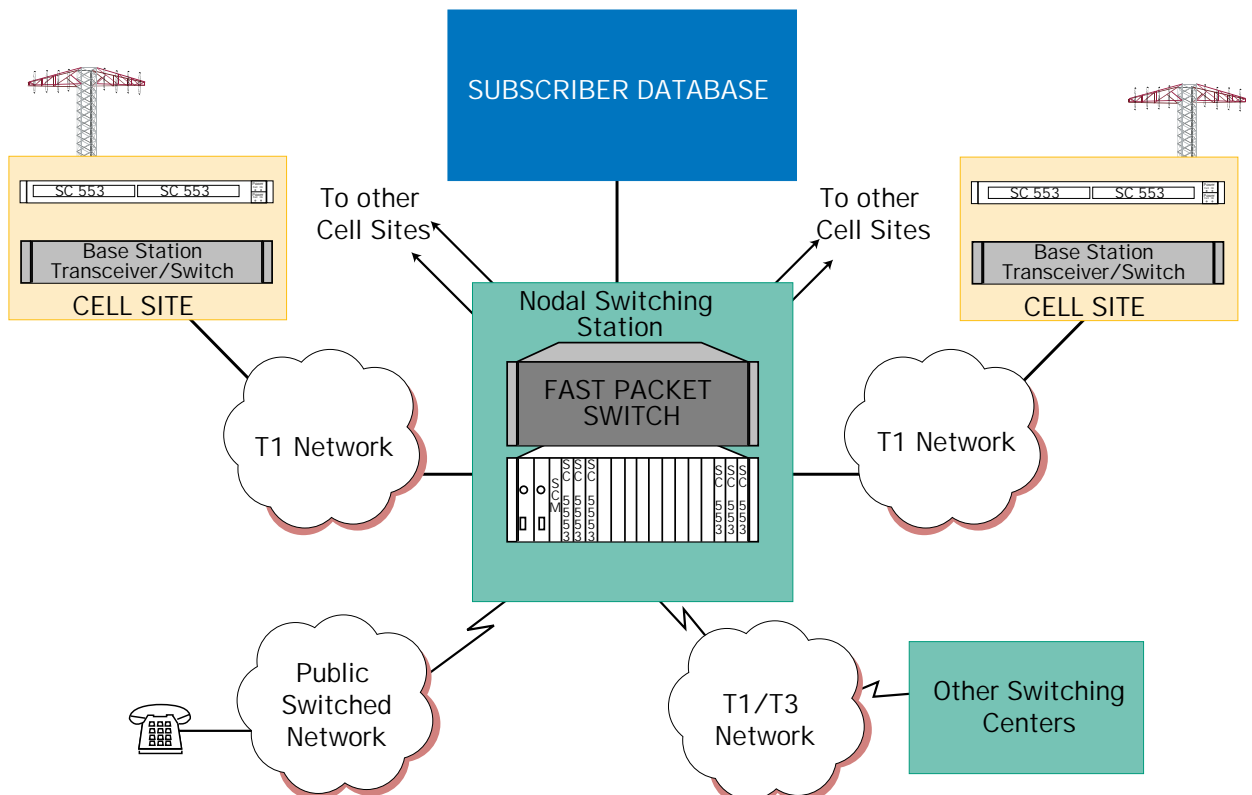


Figure 1 — Typical Cellular Network

Cellular Service Access Package

Shelf or two slot SC 2000 enclosure. The SC 553 provides data terminal connection via a V.35 or optional EIA 530/422 interfaces. An optional DSX-1 interface also allows the SC 553 to function as a T1 CSU, if required or cascade FT1 service between cell sites.

Communications with the SC 553 occur via the IP addressable SpectraComm Manager (SCM) for in-band SNMP management at centrally located sites. At remote cell sites, the SC 553 provides an alternative mode of management diagnostic communications without the need of an SCM, using a designated T1 channel (DS0), portion of a DS0 or FDL (Facilities Data Link).

Flash memory enables downline loading of software and software revisions for easy installation and upgrades to the SCM and the SC 553 at central and remote cell site locations.

The SC 553 supports the ability to monitor and report data terminal EIA leads, SNMP traps or alarms, as well as independent user and Telco performance registers. Front panel test switches are available for T1 payload and channel testing, T1 composite diagnostic loopback tests, and channel loopback test. Front panel jacks enable T1 circuit troubleshooting and T1 data stream monitoring.

SpectraComm 2000

The SpectraComm 2000 is a two card shelf designed for reliable, fault tolerant, maintenance-free operation in a cellular base station environment (Figure 2). The SpectraComm 2000 enclosure provides two DTE ports, a craft port, power and alarm connections. Plug-in SC 553 modules provide the DSU/CSU interfaces to the T1 network. The SC 2000 accepts one or two power supply modules. The second power supply automatically backs up the first in the event of failure. The SpectraComm 2000

provides external contacts to activate local and remote alarm systems. Measuring 19" W X 1.75" H X 12" D, the SpectraComm 2000 is designed for flush mount and mid-mount installations.

SpectraComm Shelf

The SpectraComm Shelf is a compact (7" High), NEBS-compliant, networked managed chassis incorporating an intelligent backplane architecture (Figure 2). The SpectraComm Shelf is ideal for use at cellular switching stations where higher T1 DSU/CSU density is required. The shelf has 16 slots to house a series of data transmission and management cards, such as the SC 553 and SCM. The management, alarms, control, and data bus can be extended to a second shelf. The shelf's compact size saves space at critical locations, as well as power, since it is designed to limit power to 6 watts per slot. A redundant power option is available, as are redundant SCMs for fault-tolerant applications.

Applications

Cascading Cell Site Application

Figure 3 shows the SC 553 deployed as a CSU in remote cell site locations. Two SC 553s housed in a SC 2000 enclosure, support reduced-cost fractional T1 services to cell sites with less active cellular phone service requirements. At each cell site, two ports of a base station transceiver/switch are each connected to a DSX-1 interface of a SC 553. In this application, one SC 553 functions as a recipient for assigned T1 DS0s while the other SC 553 functions as transporter of excess DS0x to adjacent cell sites. Typically, a DS0 is reserved for transporting network management commands and responses to each cell site. In this application, should cellular phone service requirements increase at any particular cell site, that site can be reconfigured with one or more full T1 circuits.

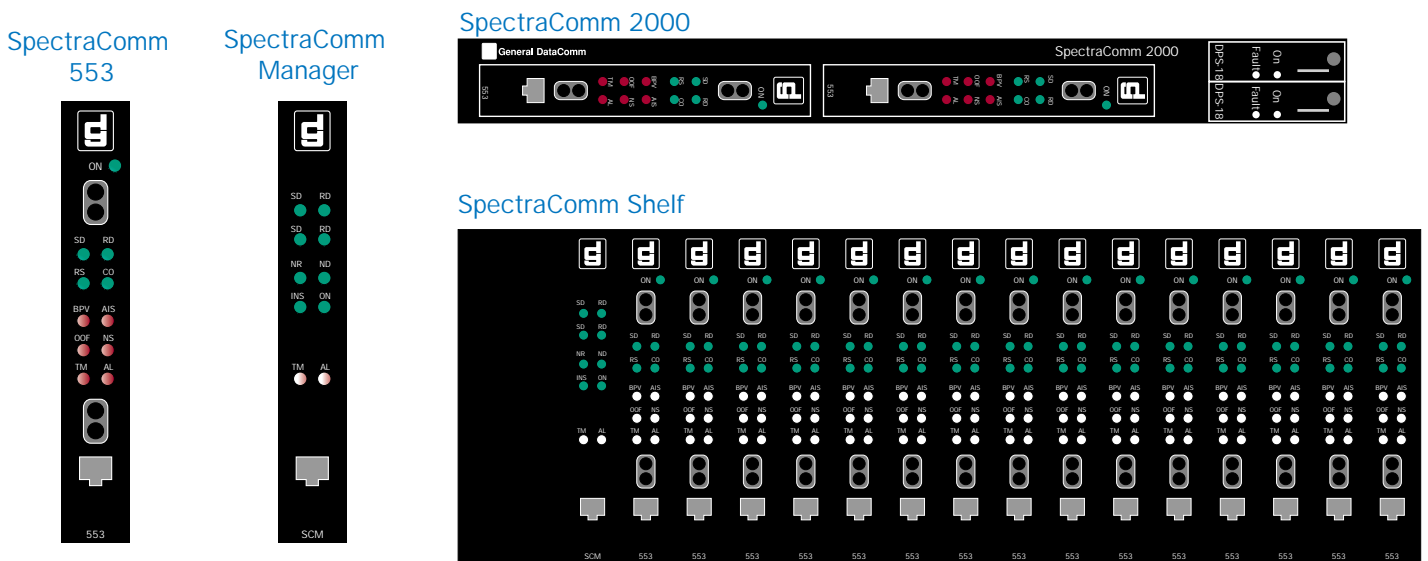


Figure 2 — CSAP Elements

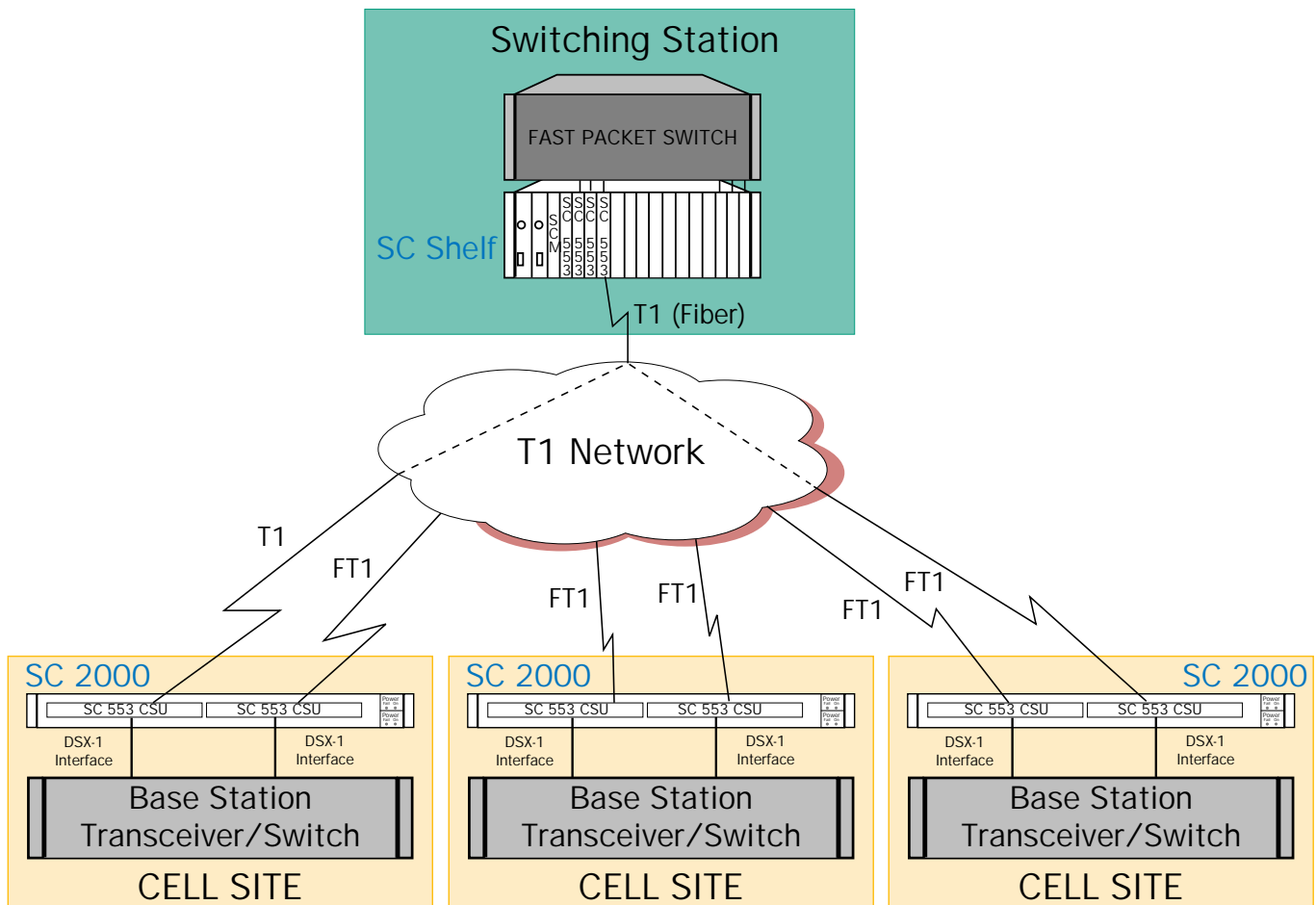


Figure 3 — Cascading Cell Site Application

The switching station is configured with a SpectraComm Shelf in support of a series of SC 553 T1 DSU/CSUs. In this example, each SC 553 at the switching station is terminated with a T1 circuit wherein each circuit support some number of cascaded remote cell sites.

T1 ACCESS & CASCADING CELL SITE APPLICATION

The application shown in Figure 4 illustrates the use of the SC 553 as a DSU/CSU at remote cell sites with corresponding units at a designated switching station. At three cell sites of this application, a single SC 553 installed in a SpectraComm 2000 shelf at each remote cell site functions as a fractional DSU as a means of conserving line costs. The DTE interface to the base station transceiver/switch is an EIA 530/422. At the switching station, a SpectraComm Shelf is equipped with an SCM card and cascaded SC 553 units. Ports on a fast packet switch are connected via EIA 530/422 interface to SC 553 units. At the remaining three remote cell sites SC 553 units employ the optional cascade port, permitting cascading among co-connected cell sites and offering another line cost savings approach.

This application can be SNMP managed from a designated location using GDC's TEAM 553 application software in conjunction with a UNIX based workstation. Telnet and MIB browsers offer less efficient management alternatives,

but are supported as an alternative to TEAM software. Network management diagnostic support for this application using TEAM 553 software consists of remote optioning of the SC 553, retrieving user and network performance statistics, performing a T1 payload loopback, performing T1 channel tests without interference to other channels, monitoring SNMP alarms, and monitoring DTE EIA lead status. Network diagnostic communications to remote cell sites requires use of the facility data link in non-DACS T1 networks or a designated T1 channel DSO in either DACS or non-DACS environments.

SUMMARY

The GDC offering for the cellular market comprises a total system solution. A low profile enclosure design to accommodate the SC 553 T1/FT1 DSU/CSU provides the bridge for wireless cellular phones to basic landline phones fitting neatly and cost effectively into remote cell site encasements. The SpectraComm Shelf for switching stations and larger nodal locations provides flexible T1 access and T1 network connectivity. Flexible data terminal equipment interfaces including V.35 and EIA 530/422. The DSX-1 option enables the SC 553 to function as a CSU as well as provide a cascading capability for fractional T1 service.

From switching stations to cell sites, end-to-end control of

the cellular network through proactive SNMP management is probably the singular most important advantage of the GDC solution. GDC's TEAM 553 application software supports this SNMP management function by presenting potential problems in a user friendly way, providing the

troubleshooting tools to isolate and act upon problems quickly, saving the user network management time as a result of its customization for the specific tasks at hand.

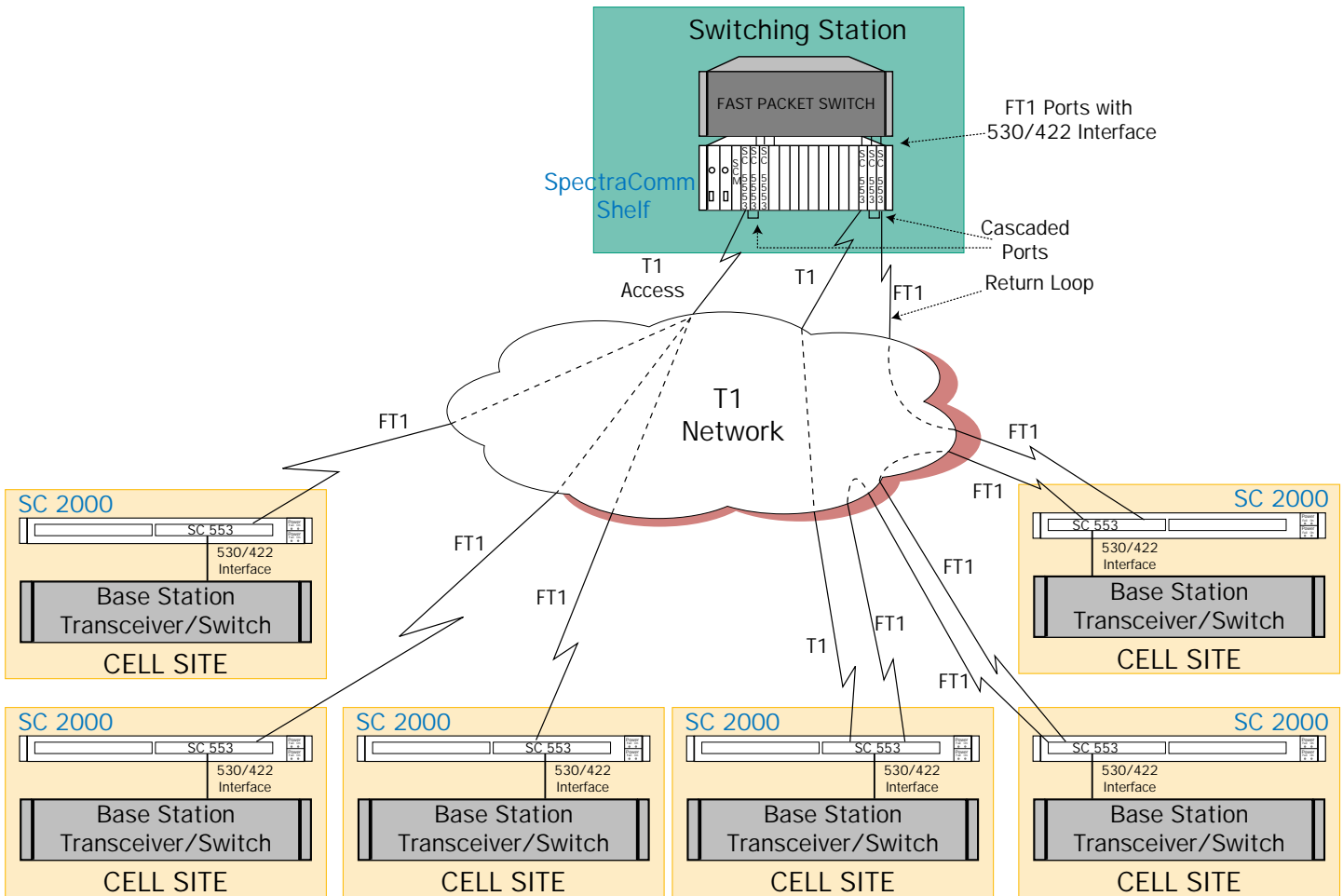


Figure 4 — T1 Access and Cascading Cell Site Application

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