

TMS-3000

Advanced Internetworking Platform

When deployed with General DataComm's Office Communications Manager (OCM), the TMS-3000 is unparalleled in combining branch office traffic onto a single backbone. The broad range of standards-compliant wide area interfaces, ranging from low speed connections through 56/64 Kbps narrowband services, fractional T1/E1, fully channelized T1/E1 and ISDN, allow network designers to select the most appropriate available services to meet bandwidth and budget requirements. The ability to concentrate traffic from hundreds of remote locations, combined with broad application support, makes the TMS-3000 the perfect choice for streamlining access into the backbone network from branch offices.

Overview General DataComm's TMS-3000, the core of the TMS (Transport Management System) product family, is a high capacity internetworking platform designed to efficiently manage all types of communications. Connections between Local Area Networks (LANs), traditional data applications, videoconferencing and voice communications are consolidated to provide a streamlined, highly integrated network. Applications formerly supported over separate LAN, data and voice networks are now effectively integrated for simpler, more cost-effective operation.

Integral to the TMS-3000 are support for such varied requirements as SNA traffic requiring predictable response times, videoconferencing, and voice traffic.

As corporate networks become increasingly vital business assets, management becomes increasingly important. The TMS family is supported by GTS, a PC/XENIX-based network management system.

Reduced Equipment Needs The TMS-3000 replaces multiple service connections and a proliferation of equipment at backbone locations. This, combined with consolidated access to branch offices, translates directly into immediate cost savings. The broad range of applications the TMS-3000 supports eliminates the need for a variety of equipment. Instead, the TMS-3000 allocates bandwidth for many services, providing routing and management functions.

Consolidates Branch Office Traffic As information becomes an increasingly important business weapon, effective, economic and reliable connections to smaller branch offices becomes strategically necessary. The TMS-3000 is a powerful platform for consolidating this branch office traffic. It com-

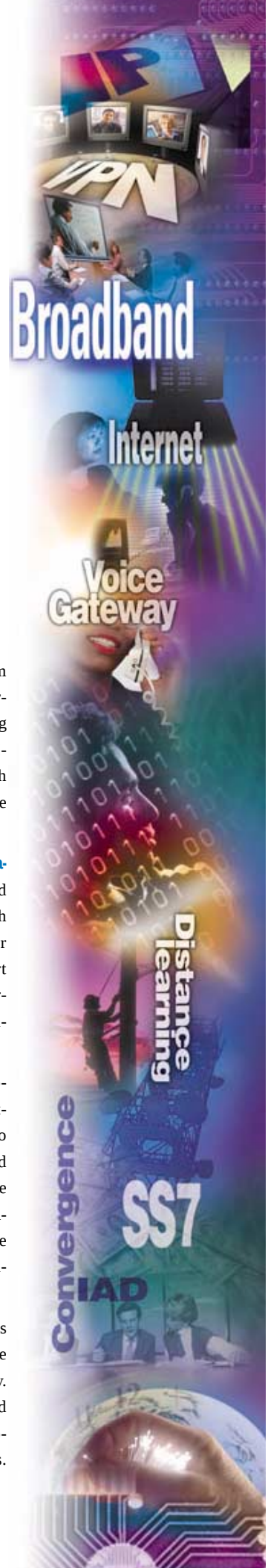


bines LAN, voice, video, and other data traffic from hundreds of branch offices over a full range of services, from narrowband to T1/E1 or satellite. Using any of these services, General DataComm's OCM-2000, which is specifically designed for branch office applications, can be concentrated through the TMS-3000.

Flexible Network Topology And System Configurations The wide variety of services that can be used with the TMS-3000 provide network planners with complete flexibility. Point-to-point, delta, star, or fully meshed topologies can be designed to support requirements ranging from T1/E1 timeslot interchange and drop and insert functions to voice compression.

High Efficiency Multiplexing The TMS 3000 provides for aggregate interfacing into the byte-oriented public network, thus facilitating access to services provided by the DACS-based network and enabling direct PBX connections in support of voice applications. To ensure low nodal delay and maximum bandwidth usage to T1/E1 environments, the TMS 3000 can also be configured to employ a highly sophisticated version of bit multiplexing.

Called High Efficiency Multiplexing (HEM), this technique is much more efficient than many subrate methods, achieving better than 99% efficiency. HEM allows more channels to be transported between network nodes, provides minimum end-to-end delays and results in excellent response times.



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Any or all data and voice channels can be contained within a bit multiplexed data frame. When so configured, the TMS-3000 aggregates transport the information at optimal efficiency, rather than burdening the multiplexer with the internal processing and buffering usually associated with byte-oriented techniques.

Voice Traffic Options GDC is a leader in voice compression technology, and the TMS-3000 supports a variety of high quality compression algorithms such as Adaptive Differential Pulse Code Modulation (ADPCM) and Codebook Excited Linear Predictive (CELP), with compression rates ranging from 32 Kbps to 4.8 Kbps, including 9.6 Kbps, which is important for Group III FAX transmission.

Both digital and analog voice interfaces are available on the TMS-3000, with complete flexibility in the way each individual voice channel is routed. Voice channels from a digital PBX can be compressed and sent to different destinations in a network, either to an analog interface, or another digital interface. Conversion between A-law and Mu-law permits voice channels to be compressed and transported between T1 and E1 networks.

The range of compression rates available on the TMS-3000 allows voice channels to be automatically further compressed in the event of network failure or congestion. This adaptive downspeaking means that network managers can adjust voice quality rather than denying service to

users under abnormal circumstances.

Data Traffic Options The TMS-3000's architecture supports two types of data transfers between TMS modules: Bit Mode and Byte Mode.

Supporting maximum granularity of channel and aggregate data rates, the bit mode transfers data between TMS modules with the lowest possible delay. Bit mode transfers operate at a 17 Mbps rate, and provide subrate and superate multiplexing and switching.

Byte mode supports transfers of byte-oriented data. Byte mode transfers operate at a 45 Mbps rate and provide multiplexing and switching of byte-oriented data. Byte mode transfers allow the multiplexing and switching of T1/E1 DS0s (N x 64 Kbps).

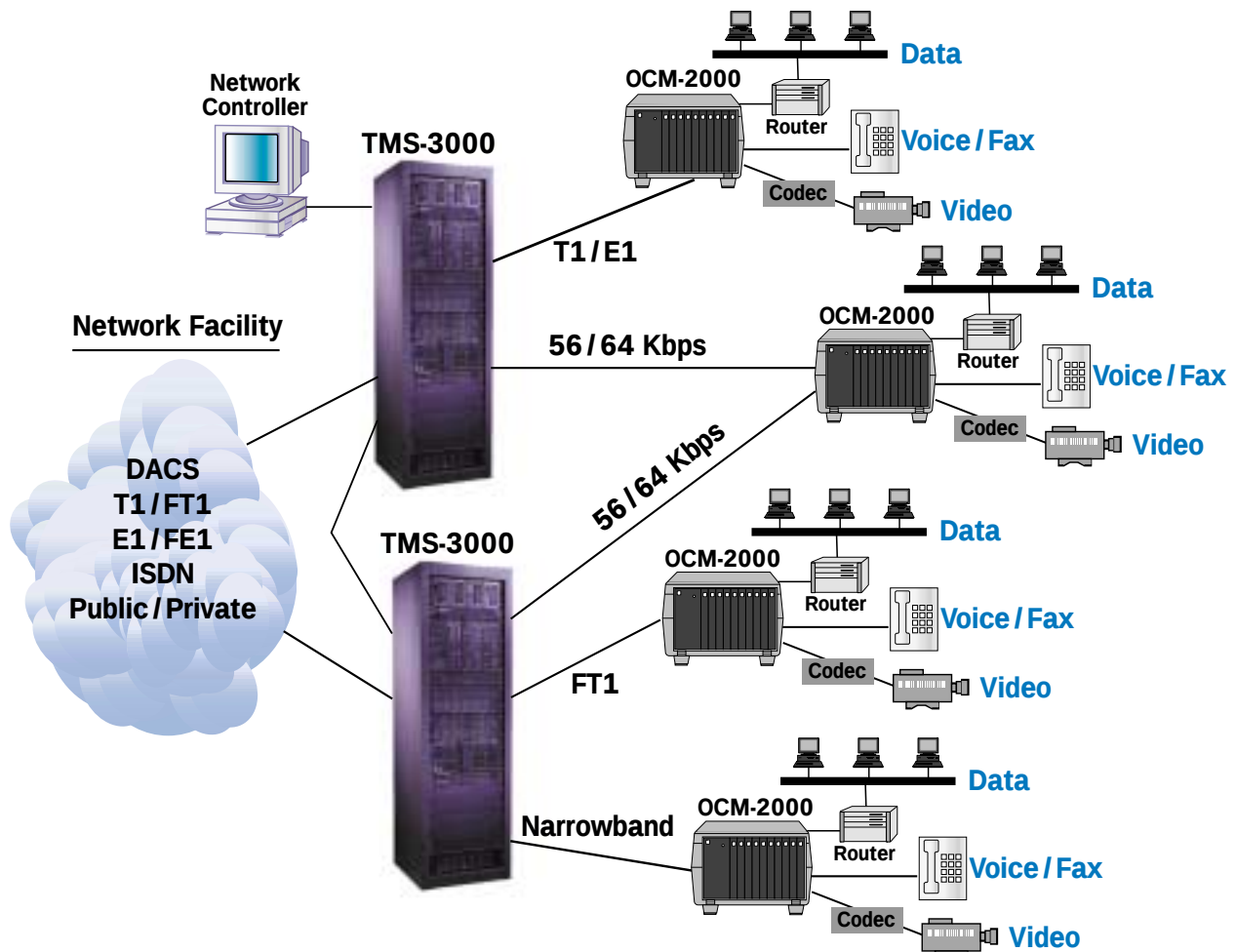
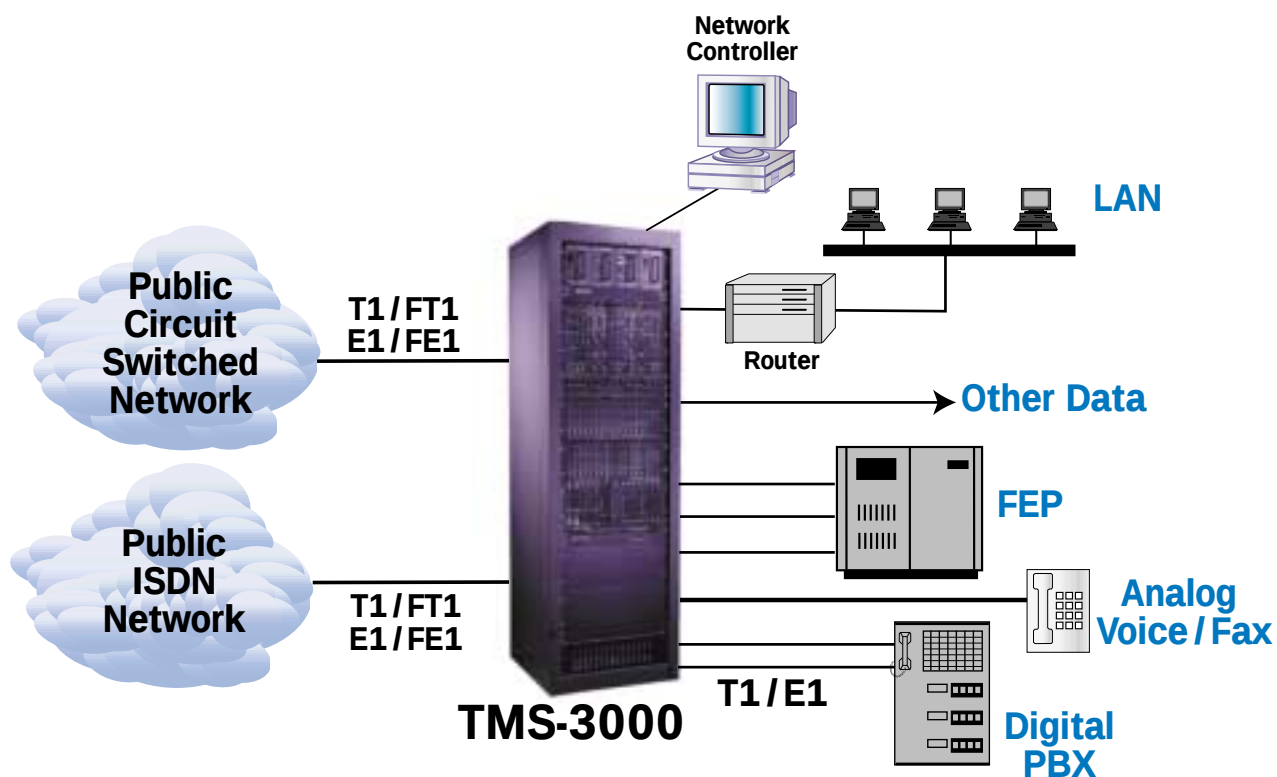


Figure 1 — TMS-3000s at Regional Offices and OCM-2000s at Branch Offices



Note: External ISDN Terminal Adapters are used for connections into the ISDN cloud.

Figure 2 — TMS-3000 Used to Combine Legacy Data, SNA and Analog / Digital Voice Traffic

Reliable, Non-Stop Operation For non-stop internetworking, the modular TMS-3000 allows specific functions to be duplicated, rather than requiring the addition of an entire shelf. Any module that could affect more than one user can be made redundant by installing an additional module. Also, in the event of a line failure, the TMS-3000 can automatically restore service via ISDN dial backup, an aggregate diversity option, or rerouting using Intelligent Automatic Rerouting (IAR).

Non-Disruptive Updates To ensure easy maintenance and upgrades, the TMS-3000 provides a unique non-disruptive software downloading capability. From one single location, the full suite of TMS operating software (not just configuration parameters) can be downloaded to the entire network without disruption. This not only eliminates the need to dispatch technicians to remote sites to change PROMs, it also allows new features to be added to the network without significant downtime.

TMS 3000 network software down-loads occur in the background and are stored in each network node until commanded to become active. Even after activation, the previous software is retained in each node, making it possible to instantly switch back to the previous software upon command.

Intelligent Automatic Rerouting The TMS-3000's Intelligent Automatic Rerouting (IAR) routine ensures rapid recovery in the event of a nodal or transmission facility failure. IAR occurs well within the time-out thresholds of front end processor sessions and is not dependent on packet-level routing. This means voice, SNA and other protocols designed for the circuit environment can be transported without packet delay while ensuring alternate path selection in the event of nodal or network failure.

Disaster Recovery While IAR automatically routes circuits around failed network resources, disaster recovery automatically redirects the end points of

the circuits. In a disaster scenario, recovery is achieved using Autopath routing principles. Each circuit's requirements, as outlined in the circuit profiles, are matched against the information in the aggregate profiles. This ensures that application quality requirements are maintained under all circumstances. In the event of a major host site failure (fire, flood, etc.), the TMS-3000 will automatically move the data and voice circuits from the primary site to a designated back-up site.

Modularity The TMS-3000's high modularity allows exceptionally easy field upgrades of hardware and software with minimal service interruption. This flexibility allows incremental integration of state-of-the-art features and capabilities for the life of a TMS 3000 network. All TMS 3000 modules are hot-swappable. As network requirements grow and change, TMS-3000 modules may be added at any time without disruption to the production network.

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GDC's extensive use of a universal, multifunctional approach to module design results in a lower complement of modules, which means lower costs for spare parts and maximum flexibility. The TMS 3000 system requires only one (optionally redundant) common logic module and redundancy control module, as well as the least number of channel cards in the industry to provide for total, transparent data and voice support.

GDC TMS Software GTS is the operating software for the TMS-3000. Once installed onto all TMS controllers (PC), the software is downloaded to all TMS-3000 and OCM-2000 nodes in a network.

GTS enables the construction of hybrid public/private network topologies and supports the Dual Private Voice module for the OCM-2000. In addition, GTS allows non-disruptive software download to OCM-2000 nodes and finer backplane "select" granularity.

Monitoring, Alarms and Diagnostics The TMS-3000 offers unrivaled monitoring, alarm reporting and diagnostics capabilities. TMS-3000 nodes regularly deliver status reports to the NMS, which formats them into status displays. Both major alarms, indicating a failure in an aggregate trunk or a group of channels, and minor alarms, indicating a failure in a single channel are reported. All alarms are time and date stamped for easy identification.

A full complement of channel and aggregate-level diagnostics and loopbacks help to troubleshoot not only the TMS system, but the entire network. For example, the TMS-3000 allows an operator to perform a Bit Error Rate Test on any circuit on an end-to-end basis, automatically and without external test equipment.

Specifications

STANDARDS SUPPORTED

ITU-T:	G.703, G.704, G.732, G.733, G.824, I.431, I.122, Q.921, Q.922, Q.931, Q.933, V.35, V.36, V.10, V.11, V.28, X.21, V.24, X.50, G.165
ANSI:	T1.601, T1.606, T1.607, T1.618, T1.620, T1.107, T1Y1.Z, T1A-232, T1A-344, T1A-422, T1A-423, T1A-530, T1A-547
AT&T:	62411, 62421, 60110, 41449, 41459, 54019A, 43801, 41458, 54015, 54016, CB-119, 62415
Bellcore:	TA-TSY-00069, TR-NPL-00054, TR-TSY-000194, TR-NPL-000342
Military:	MIL-STD-188-114A

NETWORK INTERFACES:

T1/ESF and T1/D4 (1.544 MB)
 E1/G.703, G.704, G.732, G.736
 G.703 64 KB co-directional and contra-directional
 V.35, V.36, V.11, V.24, V.28, V.10
 T1A-232, 422, 423, 530

DIGITAL CHANNEL INTERFACES:

Synchronous, Asynchronous, Isochronous, Transition Encoded, T1A-232, T1A-422, T1A-423, MIL-STD-188-114A, V.24, V.11, V.10, V.28, V.36, V.35

VOICE COMPRESSION

Analog:	ADPCM - 16, 24, 32 KB; CELP - 9.6, 6.4, 4.8 KB; Group III Fax Bypass; In-band Signaling; Digital Echo Cancellation
Digital:	E1, T1; North American Robbed Bit; International CAS, CCS; ADPCM - 16, 24, 32 KB

REDUNDANCY:

Power, Common Logic, Network Interface, Bulk Voice Compression, Channel Interface

CAPACITY PER NODE: (Configuration Dependent)

Max of 8 T1/E1 ports, up to 32 FT1/FE1 ports (DACS Switching)
 Up to 512 local data/voice channels (channels only)
 One controller (up to six controllers per network)

MAXIMUM CAPACITY PER CARD TYPE

1 port per ACC (Aggregate Control Card)
 2 ports per CDA (Combined Digital Aggregate Card)
 64 data or voice channels per CIC (Channel Interface Card)
 16 data or voice channels per expansion shelf
 4 expansion shelves per CIC

NETWORK MANAGEMENT:

TMS Controller (PC with GTS)

REGULATORY / SAFETY:

The TMS-3000 conforms with and is listed by major North American and international standards and regulatory agencies.

World Headquarters

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Broadband Division

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