General DataComm
Best Connections in the Business

TMS-3000

TMS-3000 Multi-aggregate Transport Management System

Highlights

- Allows LAN extension to remote offices via dedicated circuits over existing, high-speed TMS-OCM backbone communication network.
- Can be used to compress hundreds of voice channels over sub-T1/ E1 links for economic provisioning over circuits.
- Supports SNMP traps (GTS Version 5.1.0. and later)
- Aggregate rates to 4.224 Mbps.
- Provides secure, cost-effective "single-service" transport of voice and data to any network site.
- Supports high-speed digital DDS, channelized FT1, FE1, T1, and E1 services.
- Supports all leased line (dedicated) interfaces (V.35, 422, 423, T1/D4, G703, etc.).
- Supports satellite aggregate communications links with minimum delay.
- Compression technology and dynamic bandwidth allocation maximizes bandwidth utilization.
- Flexible, scalable packaging accommodates any central or remote sites.
- Supports analog PBX, digital PBX, or IP PBX with high efficiency multiplexing.
- Supports redundancy for power provisioning, common logic, and any line interface modules.
- Self-healing routing and disaster recovery ensures maximum availability.
- When deployed with GDC multiplexers (OCM-2000 or MiniMux TDM), concentrates branch office traffic from hundreds of locations.
- Easily tailored to point-to-point, delta, star, or fully meshed topologies to support any size organization.
- All components are modular and hot-swappable, for flexible sparing, easy upgrading, and future-proof scalability throughout the backbone network, without disruption of services.
- When equipped with Plus-series cards (ESCC-Plus, ACC-Plus, and UVC-Plus), the TMS-3000 provides heightened capabilities for critical SCADA application networks.
- GDC TMS Software (GTS) provides end-to-end management for configuration, control, alarm reporting, and diagnostics from up to six controller locations, as well as LAN-based access.

System Overview

The TMS-3000 system transports today's vital data and voice communications over a single, private homogeneous network. This unparalleled security and flexibility allows network planners to provision the constantly evolving private and public voice and data services to nodal and remote sites anywhere in the network.

For both carriers and end users, the application of appropriate technology provides the means to rapidly deploy new services without costly "forklift" upgrades, greatly reduces the need for spare parts, and eliminates the need for technical training on more than one platform.

For network applications that require full period availability with low/fixed delay, the TMS-3000 delivers high efficiency and circuit multiplexing, circuit routing, and standards-based access and termination. With all services delivered across wide areas by standard circuit switching techniques, network planners achieve the most efficient use of bandwidth, equipment, space, and human resources.

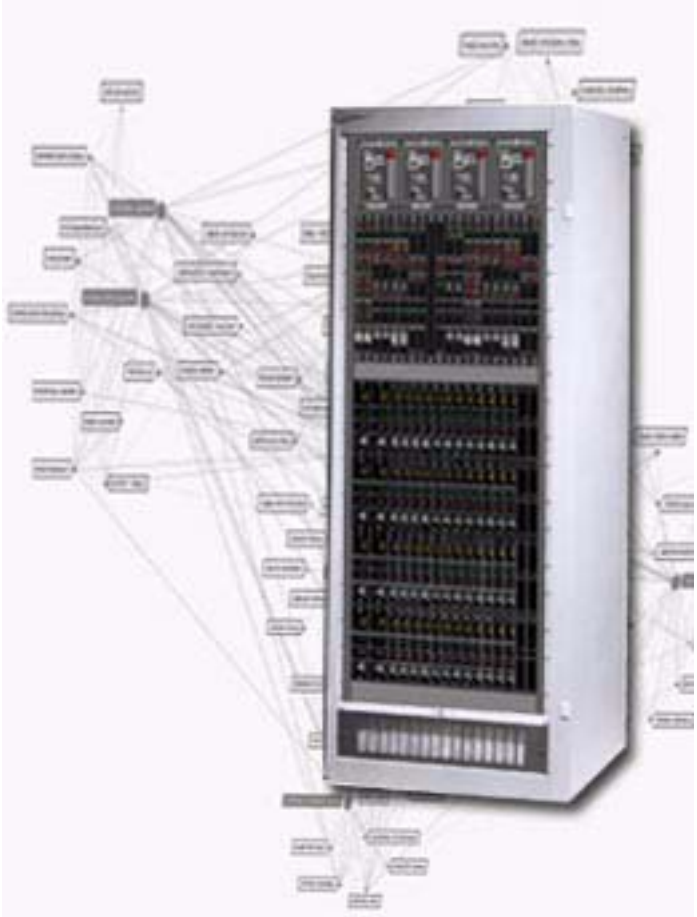


Figure 1: TMS-3000 Node in a TMS Network

VOICE & DATA

The TMS system enables the combining of virtually all possible data and voice traffic into a common backbone. By applying the appropriate technology to any given networking task, the TMS-3000 can be configured and used as a multiplexer, a voice compression device, a data compressor, or a T1/E1 cross-connect. Through the combination of these capabilities, the TMS family supports the widest possible set of network applications. For example, a single TMS-3000 node:

- Combines low speed and high speed data channels and compressed voice channels, into physical aggregates, or logical sub-aggregates, using High Efficiency Multiplexing (HEM).
- Concentrates the connections from hundreds of remote branch office routers into a managed transport system.
- Compresses the voice channels from a digital PBX and delivers them in either analog or digital form.
- Delivers Data traffic in public data format for termination on GDC or on non-GDC devices.

BIT TRANSFER MODE

The TMS architecture supports bit mode data transfers between modules in the system. Bit mode supports maximum granularity of channel and aggregate data rates. Bit mode transfers data between TMS modules with the lowest possible delay at 16+ Mbps rate. Subrate and superate multiplexing and switching is also provided. A single TMS-3000 node can be configured for up to 16+ Mbps of full duplex Bit Mode capacity.

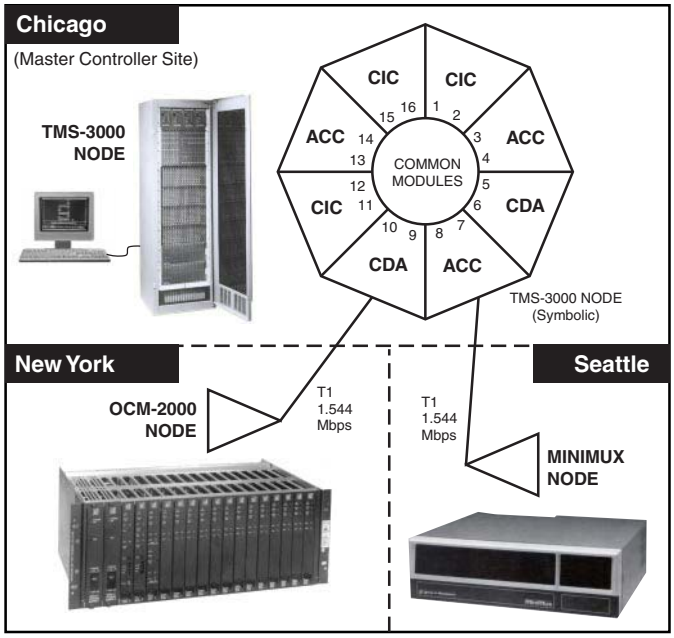


Figure 2: Typical Network Detail

KEY FUNCTIONS

High Efficiency Multiplexing

The TMS-3000 performs aggregate interfacing into the byte-oriented public network, which facilitates access to services provided by DACS-based networks and enables direct PBX connections in support of voice applications. To ensure low nodal delay and maximum use of high-speed T1/E1 bandwidth, the TMS-3000 can be configured for High Efficiency Multiplexing (HEM), which achieves better than 99% efficiency as compared to subrate multiplexing. HEM allows more channels to be transported between network nodes and provides minimum end-to-end delays for superior response times.

Voice Compression

Standard voice traffic is passed through the POTS network at 64 Kbps. TMS-3000 provides compression rates ranging from 32 Kbps to 4.8 Kbps by using a variety of high quality compression algorithms such as Adaptive Differential Pulse Code Modulation (ADPCM) and Codebook Excited Linear Predictive (CELP). The CS-ACELP voice compression algorithm reduces the bandwidth required for voice traffic to 8 Kbps while maintaining the quality of a 32 Kbps ADPCM call. This compression leads to extensive reductions in the amount of bandwidth required to transmit information across the backbone, as well as savings in infrastructure costs. TMS-3000 can further compress voice channels automatically in the event of network failure or congestion. This adaptive downspeeding means that network managers can adjust voice quality rather than allow abnormal conditions to deny service to users.

TMS-3000 supports digital and analog voice interfaces, and offers complete flexibility for individual voice channel routing. Voice channels from a digital PBX can be compressed and then transported to different destinations in a network, such as an analog interface or another digital interface. Voice channels can also be converted between A-law and Mu-law and then compressed and transported between T1 and E1 networks.

The voice compression algorithm contains an integrated 16 millisecond, configurable G.165 compliant echo canceller and a non-linear echo suppressor. The echo canceller prevents echoes that may be present on analog loops from being transmitted to the other end of the network. The echo canceller can eliminate near end echoes for telephone terminations within the allowable 9,000 foot loop length.

Fax Bypass Option

The Fax Bypass option allows the transparent bypass of fax signals at the full Group III rate of 9.6 Kbps.

TYPICAL TMS*OCM NETWORK

General DataComm's TMS-3000 is a high-capacity networking platform that efficiently transports data and voice information, and extends LANs to sites in a backbone communications network. A TMS-3000 system allocates fixed-frame bandwidth for services transport and performs end-to-end, self-healing routing.

Applications formerly supported over separate LAN, data and voice networks are thus integrated into simpler, topologies with reduced equipment requirements. The OCM-2000, a companion system for remote offices, is a compact, economical termination that provides the same level of multimedia application support as the TMS backbone equipment. Redundancy options and network management features throughout a TMS-3000 system assure a resilient backbone architecture and maximum availability.

TMS-3000 nodes at backbone locations and OCM-2000 shelves at branch/regional offices enable communication between corporate and branch locations over existing backbone equipment. Supporting components include common logic cards, expansion cards, power provisioning, expansion shelves, and PC-based management controllers that support data transport, LAN extension, redundancy, and management functions throughout the TMS network.

To extend an existing network, a TMS node termination can be co-located at one backbone location, with T1/D4 or G.704 interface connections made to the equipment already in place. At other backbone locations where new application support is required, an OCM-2000 termination can be co-located and connected to existing equipment. At remote offices, the OCM-2000 feeds into the backbone using 56/64 Kbps or N x 64Kbps services.

Rapid Recovery

Link failures are the major cause of downtime in critical communications networks. In the event of a transmission facility failure, TMS-3000 dynamically applies Intelligent Automatic Rerouting (IAR) to route circuits around failed network resources according to AutoPath parameters defined at the controller.

Designated circuits, such as voice, can be automatically downspeeded in order to maintain service to as many users as possible during the failure. IAR occurs well within the time-out thresholds of front end processor sessions.

Thus, voice, data and other protocols designated towards a failed circuit are transported without additional delay along an alternate path during the link failure. IAR speed combined with automatic downspeeding guarantees minimal - if any - disruption to users on the network.

Disaster Recovery Re-Routing (DDR)

Creating a mesh network topology and defining a backup nodal site provides alternate traffic routes in the event of a a disaster situation at a nodal location (i.e., fire, flood, etc.). In such conditions, the TMS-3000 will automatically redirect the end points of the circuits from the failed primary site to the designated back-up site. Non-critical circuits can be dropped according to circuit profiling to conserve bandwidth. TMS-3000 ensures the integrity of application requirements is maintained during DRR by matching each circuit's profile with aggregate profiles.

Reliable Non-Stop Operation

TMS*OCM systems are designed to minimize component count and power consumption, reducing the potential for equipment failure. Built-in redundancy and recovery features further ensure non-stop power provisioning, common logic operation and line interface module operation, for maximum reliability throughout the system.

Non-Disruptive Updates

From one single location, the TMS operating software and/or configuration parameters can be downloaded to the entire network without disrupting communications. Downloads occur in the background and are stored in each network node until commanded 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. This capability adds new features and reduces downtime by eliminating costly truck-rolls to remote sites to change PROMs.

Management Features

TMS-3000, OCM-2000 and MINIMUX nodes are managed by GDC's TMS controller software (GTS) from the backbone network. The GTS controller is an intuitive network management system that provides end-to-end network configuration, control, alarm reporting and diagnostics of the TMS network.

GTS Software Version 6.x runs on the Linux operating system with MySQL database software. Up to six controllers can be supported on each network, allowing management functions to be performed at several locations. LAN-based logins are also supported.

The GTS Version 6.x software supports all of the latest enhanced modules (ACC-Plus, ESCC-Plus and UVC-Plus) as well as older modules deployed in established TMS networks.

Fail-Safe Redundancy

TMS 3000 provides non-stop internetworking through integral redundancy. Any module supporting more than one channel can be made redundant without adding costly shelves or bulky external cables.

A TMS 3000 initially configured without redundancy can be easily upgraded for redundancy by simply installing additional modules. The TMS 3000 can be configured with one-to-one redundant common logic aggregates, and one-to-N power supply redundancy. All redundant cards and power supplies will immediately and automatically switch to their redundant counterparts in the event of a module failure. The switch over will occur with minimal, if any, disruption of service. This is accomplished by processing all functions simultaneously in both the primary and the secondary stand-by modules. In the event of a power supply module failure, the remaining modules will provide power for the TMS 3000 node. Power supplies, like all TMS 3000 modules, are "hot swappable", eliminating the need to remove primary power before replacement.

Cost of Ownership

Reliability, redundancy, and maintainability are hallmarks TMS 3000 design lowering the cost of ownership by:

- maintaining high reliability
- providing high bandwidth utilization efficiencies
- maintaining operation through redundancy under conditions of equipment failure
- providing rapid fault isolation
- providing single channel per module options
- minimum requirement for spare parts

Fractional E1/T1

With Fractional E1/T1, end users and carriers have more options in designing high capacity digital networks. In providing for aggregate interfacing into the byte-oriented public network, the TMS 3000 facilitates access to services provided by the DACS-based network, and also accepts direct PABX connections.

Robust Clocking

TMS 3000 supports comprehensive fallback clock sourcing. The system may be locked to any aggregate or channel, internal or external clock source, backed up by similar clock sources at any network node. The network operator simply defines a master clock node and clock stability levels. Should a clock failure occur, TMS 3000 automatically reverts to the next lower (or equal) level clock source at the master node or the closest node. This fallback occurs without service interruption if the fallback clock is closely matched to the original clock source. Clock restoral is also independent of rerouting and inter-nodal trunk failures.

Modular Scalable Design

The TMS 3000 system is highly modular, with only one (optionally redundant) common logic module and one redundancy control module. The TMS network may consist of a single TMS 3000 node with only one installed module, or hundreds of nodes with many thousands of installed modules. As network requirements grow and change, TMS 3000 modules may be added at any time without disruption to the production network.

The modular, scalable design allows for exceptionally easy field upgrades to 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.

The TMS 3000 system makes maximum use of a "Universal" module approach to reduce the need for on-site spares, and to allow maximum flexibility. For example, a single Universal Data Channel (UDC) module is configurable on-site for many types of interfaces and rates. This provides a significant level of efficiency for support of data applications due to the wide range of configuration possibilities afforded by one card. UDC cards support speeds ranging from 75 bps to 2.048 Mbps which are software selectable from the Network Management System.

The TMS 3000 requires the least number of channel cards in the industry to provide for total transparent data and voice support. Data and voice cards are compatible with the TMS Compact, the OCM-2000, and the MiniMux TDM.

- The Universal Data Channel card supports synchronous, asynchronous, isochronous, and transition-encoded data.
- The Universal Voice Channel card supports FXS, FXO and E&M voice applications.

TMS-3000 Plus Systems

When equipped with "Plus" series modules (ESCC-Plus, ACC-Plus, and UVC-Plus), a TMS system can provide heightened features, standards and rate capabilities required in mission critical networks.

The enhanced performance features in the "Plus" common cards allow the TMS to continuously monitor performance of primary and alternate aggregate links, and employs confidence factors to comparatively measure error rates, regardless of disparate data rates. The ESCC-Plus, the ACC-Plus, and the GTS Controller Version 6.x or higher are required to achieve the "Plus" capabilities.

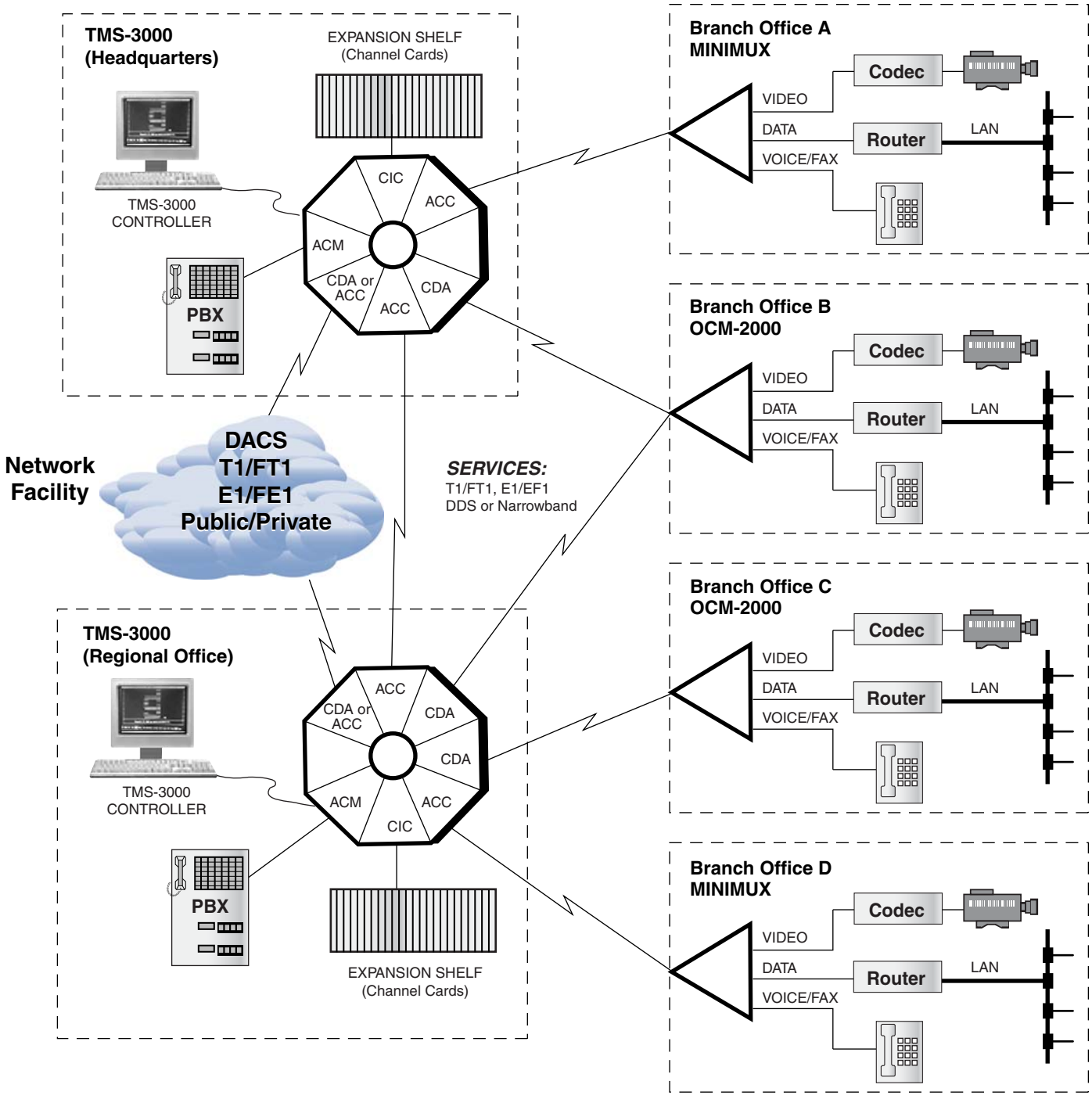


*Figure 3: Typical TMS*OCM/MINIMUX Network*

Figure 3 is a logical diagram of a simple TMS*OCM/MINIMUX network that employs CDA and ACC modules at the TMS-3000 node to create aggregate communication links to OCM-2000 and MINIMUX nodes at regional and branch offices. Channels are configured for T1/FT1, E1/EF1, DDS or Narrowband services.

CIC modules at the nodes increase voice and data channel card density by linking to expansion shelves. CDA or ACC modules connect to PBX equipment via an ACM, allowing off-premise voice extensions and cost-saving voice compression to branch offices. One or more TMS controllers conduct the end-to-end network management.

Major Hardware Components

TMS-3000

With all of the power and capabilities of the TMS, surprisingly few modules are required. GDC's extensive use of a "universal" multi-functional approach to module design results in a lower complement of modules, which results in lower costs for spare parts.

TMS-3000 main shelf modules include:

- Power Supplies (up to four)
- Combined Digital Aggregate (CDA)
- ADPCM Compression Module (ACM)
- Aggregate Control Card (ACC/ACC-Plus)
- Channel Interface Card (CIC)
- Enterprise System Control Card (ESCC/ESCC-Plus)
- Redundant Control Card (RCC)

Expansion Shelf components include:

- Expansion Card(s)
- Universal Data Card (UDC)
- Universal Voice Card (UVC/UVC-Plus)
- Time-Independent Data Channel (TID-III)

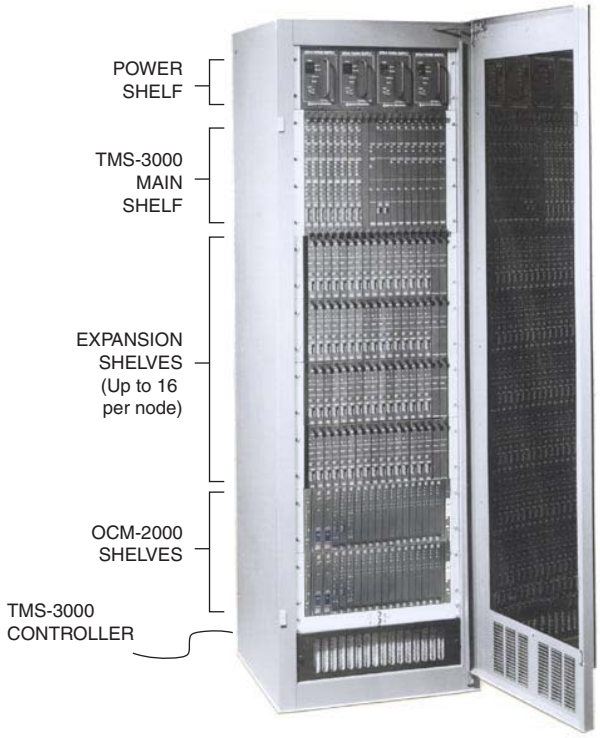
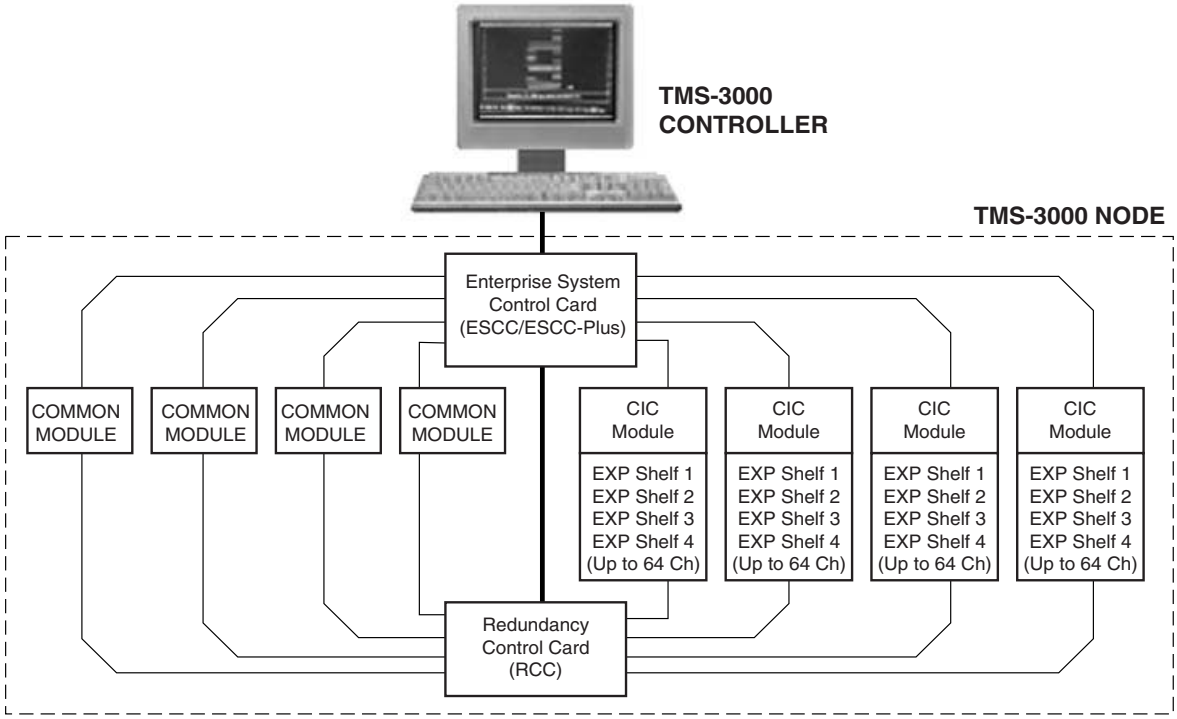


Figure 4: TMS-3000 Hardware Components



Note: Common Modules in the in the TMS-3000 Main Shelf can be ACM, ACC/ACC-Plus, CDA, or CIC modules.

Figure 5: TMS-3000 Logical Components

TMS Modules Overview

Common Logic Modules

Enterprise System Control (ESCC/ESCC-Plus)

The ESCC module monitors and controls the activities of all the other cards and modules in that shelf. The ESCC stores configuration information for the local TMS-3000 node and provides permanent storage of software programs for all of the common logic cards in the TMS*OCM system. It also communicates with a local controller, with other ESCCs in the TMS-3000 network. The ESCC controls downloads, clocking and redundancy of common cards.

Aggregate Control Card (ACC/ACC-Plus)

The ACC controls the transfer of data across an aggregate trunk to another TMS-3000, OCM-2000 or MINIMUX node at up to 4.244 Mbps. Data is derived from CIC, ACC or CDA modules via the Common Equipment Bus, assembled into an aggregate bit stream, and transmitted across the aggregate trunk. Data received from the aggregate trunk is de-multiplexed and distributed to either ACC, ACM, CIC or CDA modules.

Redundancy Control Card (RCC)

The RCC maintains a set of primary/secondary signals that are directed to each redundant pair of cards. The RCC determines if a card is present in each slot; if only one card of a redundant pair is present, that card remains in service.

ADPCM Compression Module (ACM)

The ACM compresses multiple voice channels for a substantial bandwidth savings over 64K PCM. This bandwidth savings can be used during disaster recovery and fall-back where the ACM can further compress voice channels to provide more active circuits. Available as T1 or E1 device.

Combined Digital Aggregate (CDA)

The CDA connects TMS nodes and multiplexers at remote locations. Each CDA exchanges data with other CDA, ACC, or CICs in the TMS-3000 main shelf via the TMS-3000 Fast Bus. CDA-T1 modules interface between the public T1 network and a TMS-3000 network. CDA-E1 Modules allow full duplex access to ITU-T structured public networks at 2.048 Mbps.

CIC Card

The CIC interfaces up to 64 local channel cards. It multiplexes and demultiplexes data from channel cards onto a high-speed 16.896 MHz bus, allowing communication to all common cards installed in the node. The CIC is also responsible for frame calculation, channel control and communication with ESCCs and RCCs.

Data Channel Cards

The TMS-3000 system employs a universal module design for maximum flexibility reduced on-site spares. TMS 3000 modules may be added any time without disruption to the production network. TMS-3000 data and voice cards are compatible with the OCM-2000, TMS Compact and MinMux TDM systems.

Universal Data Card (UDC)

The Universal Data Channel (UDC) module can be configured for a variety of interfaces types and rates from 75 bps to 2.048 Mbps. The UDC supports synchronous, asynchronous, isochronous, and transition-encoded data.

When the UDC is equipped with the Hyper Plug-In Card option, data channels operate error free in the presence of up to 32 bits of frame jitter. This feature extends the receive buffer up to 64 bits.

Time-Independent Data Channel Card (TID-III)

TID-III Data Channel Module allows true isochronous/plesiochronous data communication in a TMS-3000. TID-III accepts RS-422 data and clock inputs at any one of 18 standard rates from 1.0 Kbps to 1.024 Mbps. TID-III is programmed to accommodate special rates or to automatically track variable rate input clocks up to a specified maximum.

Other Supported Modules

Sync Status Modules (SSM)

SSM modules install in any channel slot to detect out-of-sync conditions at the node.

- The SSM with Channel Alarm capability can detects fault conditions at data or voice channel modules.
- The SSM with Crypto In Sync capability is for high security TDM systems using cryptographic equipment to scramble aggregate data. When this model detects out-of-sync conditions at the primary ACC link, it uses its output signal to connect a dial backup link.

Aggregate Interface Plug-ins

Aggregate Interface devices plug into the ACC/ACC-Plus modules to convert aggregate data to a wide variety of signal standards required by a particular aggregate trunk.

TMS-3000 Plus Systems

In this document, information referring to the classic ACC, ESCC, and UVC modules also refers to their "plus" version counterparts, e.g., ACC-plus, ESCC-Plus, and UVC-Plus, except where noted. If your TMS-3000 Plus system includes legacy modules and devices from earlier releases of the TMS-3000, these devices may have limited availability and/or support. For information on the availability or interoperability of legacy devices in a TMS-3000 Plus system, contact your GDC representative.

Voice Channel Cards

Universal Voice Card (UVC)

The analog Universal Voice Card provides full-duplex voice communication functions, with options for Pulse Code Modulation (PCM) and Adaptive Differential Pulse Code Modulation (ADPCM). One of two models of the UVC connects to the backplane of the TMS-3000 Channel Expansion shelf:

- Universal Voice Card (GDC 036P265-002) provides PCM voice encoding at a data rate of 64 Kbps.
- Universal Voice Card (GDC 036P265-003) provides ADPCM voice encoding at software controlled variable data rates of 16 Kbps, 24 Kbps, or 32 Kbps with a PCM fallback mode (PCM-T) at a 64 Kbps rate.
- When equipped with the Echo Canceller Piggyback card, UVC cards at both ends of the communication link can eliminate round trip delay echo.

Universal Voice Card Plus (UVC-Plus)

The Analog Universal Voice Card Plus (UVC Plus) is a single channel voice module that provides full-duplex voice communication capabilities and eliminates the requirements for external signal conversion equipment. The UVC-Plus card is capable of Pulse Code Modulation (PCM), Adaptive Differential Pulse Code Modulation (ADPCM) and Codebook Excited Linear Prediction (CELP) .

The UVC-Plus utilizes an onboard microprocessor and supports E&M and 2-wire FXs/FXO on the same card, eliminating the need for external signaling and terminating equipment. Standards compliant UVC-Plus supports the following protocols:

- G.711 compliant PCM (64 Kbps)
- G.726 compliant ADPCM (16, 24, and 32 Kbps)
- G.729 compliant CELP (8 Kbps)

Voice Quality

Voice quality is highly subjective, however standardized quality testing such as DAM (Diagnostic Acceptability Measure), and MOS (Mean Opinion Score, CCITT P.80) indicates the relative quality of voice compression implementations. The TMS-3000 supports the highest quality voice compression techniques available.

The table below compares DAM and MOS voice quality scores of GDC voice compression techniques with competitive products and with standard PCM scores

GDC Compression Techniques	DAM Score	MOS Score
ADPCM 32 Kbps	69	3.8
ADPCM 24 Kbps	62.2	3.3
ADPCM 16 Kbps	53.6	2.7
CELP 9.6 Kbps	65	3.5
CELP 6.4 Kbps	61.4	3.3
CELP 4.8 Kbps	59.4	3.1
Compared with		
Competitive Product	57.6	3
Standard PCM 64Kbps	80.8	4.9

NOTE: Voice quality scores are of value only when compared to scores tested under identical conditions.

TMS-3000 Plus Systems

If your TMS-3000 Plus system includes legacy modules and devices from earlier releases of the TMS-3000, e.g., Voice II, VLBRV/FAX, or CELP channel cards, these devices may have limited availability and/or support. For information on the availability or interoperability of legacy devices in a TMS-3000 Plus system, contact your GDC representative.

Value-Added TMS-3000 Applications

High Efficiency Bit Interleaved Multiplexing

TMS-3000 can be configured for high efficiency bit interleaved multiplexing (HEM) to ensure low nodal delay and assure high efficiency. GDC's HEM is better than 99% efficient, allowing more channels to be transported between network nodes. HEM also provides minimum end-to-end delays and excellent response times.

Any or all data or voice channels can be contained within a bit multiplexed data frame. When so configured, the TMS-3000 aggregates can transport the information at optimal efficiency, rather than burdening the multiplexer with the internal processing and buffering usually associated with byte oriented techniques. These bit-oriented multiplexed frames, containing a collection of data or voice traffic, can be delivered to the Wide Area Network in any of the following formats:

- Within one or more DS0s of a T1/E1
  (up to 31 such frames may be present in a E1;
  up to 24 such frames may be present in a T1)
- Full T1/E1 or FT1/FE1
- As a V.35 / RS-422 / EIA-530 / V.11 aggregate

Each TMS-3000 node can produce up to 256 HEM bit-oriented frames, each containing up to 254 channels of data or voice traffic, for a maximum of 2032 channels per node. The TMS-3000 performs channel cross-connecting at the channel level, insuring high efficiency, rapid circuit-level rerouting, and maximum flexibility.

Autonomous Switching

When provisioned with a customer supplied Redundancy Switch System (RSS), a TMS-3000 Plus system can provide an interface to the RSS on a per aggregate basis in order to participate in autonomous switching applications. An ESCC-Plus and an ACC (classic) or an ACC-Plus are required at nodes on both ends of the aggregate link.

The ACC/ACC-Plus provides data on good/bad seconds (ES, SES, CSES) as detected at the primary and alternate aggregate paths. The ESCC-Plus calculates the error rate and applies the user-configured confidence factor to assign a condition to each aggregate (Available, Unavailable, Degraded).

The ESCC-Plus sends the status as a message to the RSS for circuit switching as needed. This allows for faster switch response since automatic switch decisons are made locally, rather than via an attended Network Management Control System.

Byte Oriented, Standard Time-Slot-Interchange Multiplexing

TMS-3000 fully complies and interoperates with T1/E1 network standards and services. Standard n x 64 Kbps or N x 56 Kbps circuits can be directly provisioned. In DACS groomed networks, these standard data channels may be terminated directly to 56/64 Kbps data services via any standards compliant T1/E1 multiplexers, e.g., OCM-2000.

In-Band Management for Integrated Access

The TMS-3000 establishes network management and control by embedding network management information into each 64 Kbps DS0, or into a bundle of multiple 64 Kbps DS0s, providing inter-operation with public network services while adding end-to-end network management. The end-to-end network management of the TMS-3000 assures disaster recover to a DS0 granularity whereas public network disaster recovery very rarely goes below the DS1 level. Users thus derive the full economic benefits of Fractional T1/E1, DACS (Digital Access and Cross-Connect System) and groomed network services while retaining strong TMS network management capabilities.

Because TMS also utilizes High Efficiency Multiplexing while allowing access to byte oriented public networks, users derive the advantages of all three networking environments. This allows maximum efficiency and flexibility without sacrificing performance or critical network management features.

Hybrid Networking Using DACS Grooming

Interconnecting and managing the data, voice, and LAN requirements of hundreds of remote branch offices via circuit provisioning makes TMS-3000 is the ideal platform for central and regional concentration. TMS-3000 allows the network planner to take advantage of industry-standard DACS switching which makes this capacity possible.

In addition to supporting branch office connection via point-to-point lines, TMS can form hybrid networks. Up to 31 branch office OCMs (Office Communication Managers) can be connected to the TMS-3000 via each E1 (24 for T1) using DACS switching to deliver a single 56/64 Kbps DS0 to each OCM. And each TMS-3000 can support the connection of up to 256 branch office OCMs.

The TMS-3000 is also unique in allowing each remote office to incorporate voice, data, and LAN traffic while maintaining complete end-to-end network management using a minimum of overhead bandwidth.

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