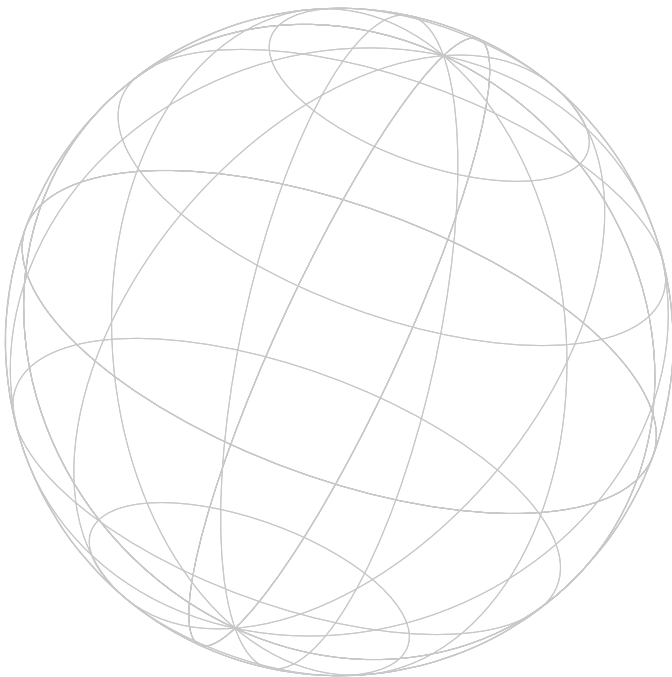
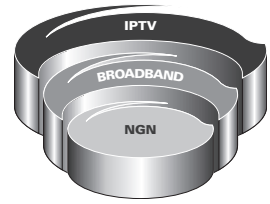




## TRANSACTION GATEWAY 2.5

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Application Brief



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### 1. Overview

The UTStarcom Transaction Gateway offers the market leading solution for carrier class transaction network service providers. This specialized software suite can enable fast transaction processing of credit card authorizations, debit card fund transfers, health benefit authorizations, electronic benefits transfers, and other communications involving single-session transfer of small amounts of data.

The Transaction Gateway (TG) 2.5 is the next generation high density transaction processing gateway designed to run on the industry leading UTStarcom Total Control® 1000 multiservice access platform.

Transaction Gateway can be used for transaction processing over an X.25 network or over an IP network. In addition, the transaction gateway speeds transaction times with features such as Fast Connect, (reduces or eliminates steps such as alerting, audible ring, billing delay, answer tone, and call termination); and supports transaction protocols such as VISA I/II and Synchronous Data Link Control (speeds calls and reduces traffic to a processing host by up to 50 percent) with full protocol emulation.

The X.25 PAD provides standard X.25 PAD network access between the Total Control 1000 and the X.25 data network and can be configured with non error-correction or error-correction protocol over the PSTN. The X.25 PAD can be used as a stand alone application for network access.

TG 2.5 provides increased density with the support of the Total Control 1000 Enhanced Data System (EDS) based hardware. The solution provides the capacity of 672 T1 DS0 and 630 E1 DS0 ports per Transaction Gateway.

## 2. System Network

The Transaction Gateway connects transaction terminals to a host authorization system using X.25 or TCP/IP network. In this below diagram, the Transaction Gateway acts as an intermediary, appearing to Point of Sale (POS) terminals as a host.

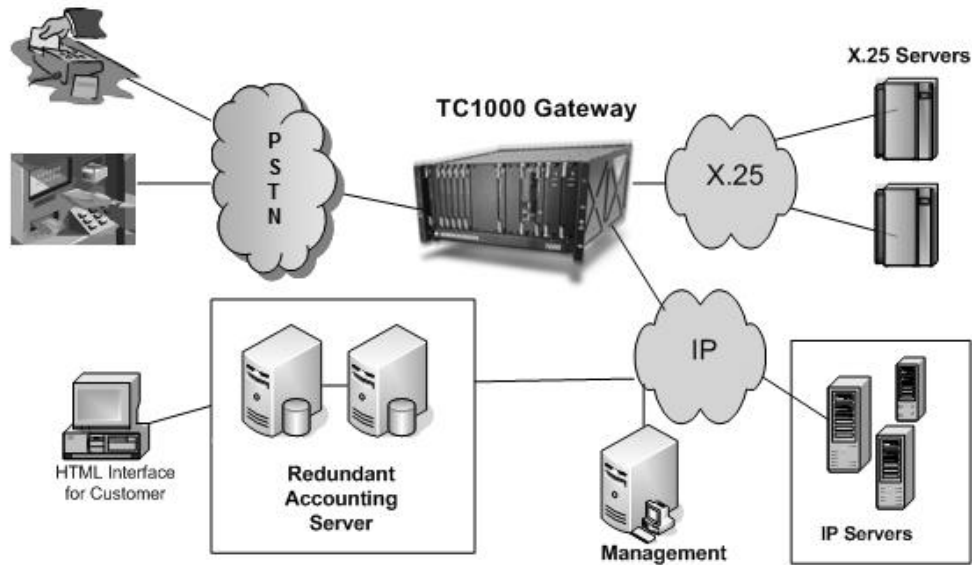
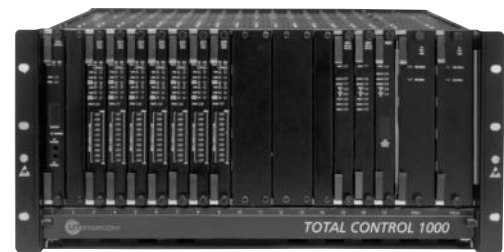


Figure 1: Transaction Gateway System Network

## 3. Total Control 1000 Chassis

Total Control 1000 system is designed to ensure no single point of failure for maximum uptime and higher availability. This modular platform is based on redundant power supplies, and hot-swappable network interface and application cards. The system combines digital signaling processor (DSP) technology, Access Router Cards (ARC), and management software to provide fast, reliable connectivity using today's most advanced communications technologies.



**High-speed mid-plane:** The platform provides multifaceted high-speed transport capability for Time Division Multiplexing (TDM), packet, and network management traffic within a single platform. This unique bus architecture allows the multiservice access platform to natively accept wide-area TDM-based traffic on the TDM bus and also interact natively with local area packet-based traffic via the packet bus.

**Modular Architecture:** The platform includes intelligent Network Application Cards (NACs) in front of the platform where they can be easily swapped and Network Interface Cards (NICs) in back where cabling is secure and out of the way.

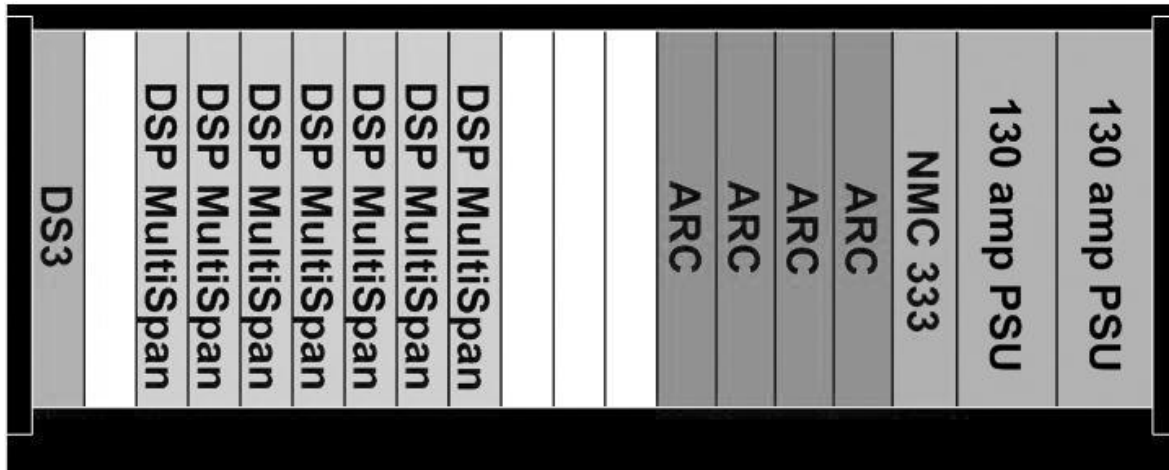


Figure 2: Transaction Gateway 2.5 Chassis Layout

**DS-3 card set:** The optional Total Control 1000 DS-3 ingress card can provide customers with a cost-effective solution for terminating DS-3s rather than direct E1/T1 signals to Total Control 1000 DSP multispan card sets. Each set functions within the Total Control 1000 system to provide WAN ingress access via DS-3 connectivity. The DS-3 ingress card terminates a DS-3 span consisting of 28 individual T1 spans, breaks it down into 672 individual channels, and then forwards DS-0s to DSP multispan cards.

**DSP MultiSpan (DSPM) card set:** The advanced design of UTStarcom’s 96-port Total Control 1000 DSP multispan card set enables multiple modem sessions, ISDN processing, and PPP co-processing on a single DSP—delivering high-level functionality in a small space. The card set can process three E1 (90 DS0 per card) or four T1 spans (96 DS0 per card) within just one platform slot.

Unlike a simple modem card, the DSP card set features a fully reprogrammable DSP engine that can allow administrators to reconfigure the system to implement new technologies and applications. The card set supports a full range of trunk and communications standards, including V.Everything, V.92, V.44 error correction, and many variations of CAS/PRI.

**Access Router Card (ARC) set:** The Total Control 1000 access router card (ARC) set works with Total Control 1000 DSP card sets to process packet content of digital and analog connections and route up to 336 transaction calls to the hosts. The ARC set includes V.35 NIC, which provides both X.25 as well as ethernet interfaces. ARC implements various transaction protocols like VISA I and VISA II. As an example, for asynchronous VISA® transaction

processing, ARC supports the VISA configuration modes like Full Emulation, Full Emulation/ No Acknowledgment, ENQs Only, ENQs Only No Framing, Transparent. (refer to user manual) for a complete list of transaction protocols supported refer the user manual.

**Network Management Card (NMC) set:** A core component of the Total Control 1000 network management solution, the NMC provides complete SNMP-based remote management of the Total Control 1000 system.

The NMC can provide:

- Robust chassis event and alarm reporting
- Configuration management
- Software download to chassis elements
- Chassis parameter storage
- Rapid response to pre-configured chassis events

**Dual Power AC/DC Supply:** Dual load sharing and redundant power supplies guarantee maximum system uptime.

## **4. Transaction Processing Applications**

### **4.1 Acting as an Intermediary**

In this mode, the Transaction Gateway acts as an intermediary, appearing to Point of Sale (POS) terminals as a host, but communicating to the host using far fewer packets than would be required if the POS terminal connected directly to the host. This reduces X.25 or TCP/IP network congestion and time spent by the host in handling responses, allowing the host to handle more calls per day. It also provides a means of connecting a wide variety of POS terminals to the same host by providing configurable protocol options on a per call basis.

### **4.2 Speeding Transaction Processing**

Credit card companies and similar industries use modems connected to the public switched telephone network (PSTN) to authenticate clients and perform transactions. In addition to credit card authorizations, other applications that use transaction processing include transfers of debit card funds and health benefits information. Transaction processing requires transferring relatively small amounts of data in a single user session. A key element of these types of transactions is the need to quickly establish an end-to-end link and transfer the data efficiently and without errors.

There is a connection bottleneck in the way modems communicate. The first few seconds of connection time between two modems are used to negotiate a maximum link rate for communication. This process takes longer if one of the modems is low speed because the negotiation starts at the highest possible link rate and works down until a common rate is established.

This negotiation time is acceptable for some applications, such as Internet connections

where the connection time for each location is fairly long. It has a much larger impact on the transaction processing industry because connection time between modems is very short. In this case, the negotiation time is a large part of the overall connection time. The Transaction Gateway/X.25 PAD meets the needs of standard PAD (Packet Assembler/Disassembler) users that connect using high-speed modems. In addition, it meets the needs of users in transaction environments where low-speed modem connections are standard.

The Transaction Gateway/X.25 PAD includes fast-train capability, which significantly reduces the training times of 1200-bps and 2400-bps modems. Originating 2400-bps modems must support the proprietary fast-train protocol to receive 2400-bps fast-train benefits.

## 5. Features and Functions

### 5.1 Dialed Number Identification Service (DNIS) with Transaction Processing

The Transaction Gateway/X.25 PAD maps Dialed Number Identification Service (DNIS) digits from the PSTN into specific X.25 Network Terminal Numbers (NTNs). When using IP connectivity, the Transaction Gateway maps DNIS digits to specific TCP host and port numbers. This allows transaction-processing centers to use the rich addressing capabilities of both the PSTN and the X.25 or IP network together. For example, a center may choose to route transactions to different X.25 addresses depending on the destinations of the transactions.

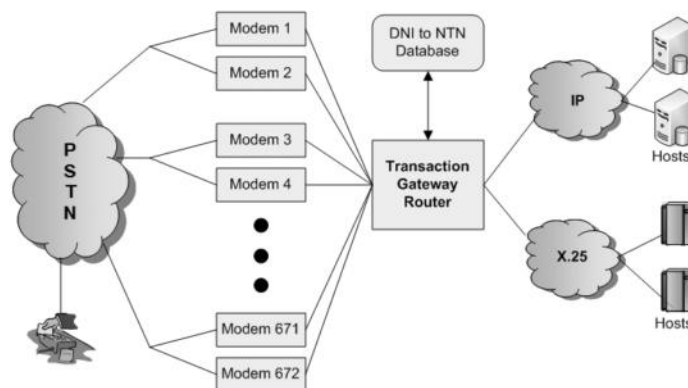


Figure: DNIS service with Transaction Gateway

As shown in above figure, if the transaction terminal dials a unique number identifying the credit provider, a Total Control system using the Transaction Gateway can map this telephone number (using DNIS Feature Group B or D) to a particular X.25 address or TCP host and port number.

With the Transaction Gateway Off-Line Configurator (see Off-Line Configurator Guide), users may define a DNIS configuration which specifies either each PSTN DNIS-to-X.25 Network Terminal Number (NTN) mapping or each PSTN DNIS-to-TCP host/port number. The Transaction Gateway currently supports 5000 DNIS entries, which can be "mixed" so that some dialed numbers invoke Transaction Gateway, and others invoke only X.25 PAD.

## **5.2 X.25 PAD Features**

- DDN compliant X.25 standards
- X.25 call setup during modem negotiation
- Per-call configuration of X.25 parameters based on DNIS
- Call routing based on DNIS
- Persistent Switched Virtual Circuits
- Network data rates up to 2 Mbits/sec
- Per-call modem parameter configuration based on incoming DNIS
- Dialout to the PSTN network
- Incoming calls at data rates from 300 to 56K
- T1, E1, and ISDN
- Automatic load sharing between the two interfaces on the Transaction Gateway Dual-port V.35 NIC board and between a pair of ARC boards
- Automatic failover of calls to a second WAN interface and ARC if X.25 trunk failure occurs

The X.25 PAD supports these ITU-T recommended standards:

- X.3 - Set of user-configurable parameters in the PAD that controls the functional characteristics of an attached asynchronous terminal. The X.25 PAD supports the standard twenty-two CCITT defined user profiles and an additional six UTStarcom defined parameters
- X.28 - Commands and responses needed to read or modify the X.3 parameters
- X.29 - Remote exchange of control information and user data between an X.25 host and X.25 PAD
- X.121 - The ITU-T address format of the X.25 protocol suite used as part of call setup to establish a switched virtual circuit.

## **5.3 Transaction Gateway Features**

- VISA I/II transaction protocols and processing
- Synchronous Transaction Protocol (ISO8583/SDLC) and processing
- Batched transaction processing
- Per-call configuration of modem parameters based on incoming DNIS
- Incoming calls at data rates from 300 baud to 56K
- TPDU Routing
- T1, E1, and ISDN
- Auto detection of asynchronous versus synchronous transactions
- Faster modem training times using the proprietary "Fast Connect" negotiation
- Routing transactions over either an X.25 or an IP network

- Performance monitoring of transaction statistics allowing early detection of possible T1 or X.25 trunk problems
- Call statistic accounting
- X.25 dialout
- X.25 PAD
- A combination of transaction calls and X.25-only calls on a per-call basis
- EIS standards 1051 and 1052
- Offline configurator
- CEM integration
- DNIS
- X.28
- X.29
- Transaction related SNMP traps
- Automatic shutdown due to high temperature
- AC and DC power

## **6. Managing a Large Network**

Managing a large network of chassis containing the Transaction Gateway/X.25 PAD is relatively straight forward. Typically all elements in the network are configured the same. Once the desired configuration has been created for one Transaction Gateway/X.25 PAD in a chassis, it can be saved and downloaded to every other Transaction Gateway/X.25 PAD in the network without modification.

Most of the modem parameters can be configured using the Transaction Gateway/X.25 PAD Off-Line Configurator. At the same time, Common Element Manager or a modem template may be used to configure only those parameters that cannot be configured through the Transaction Gateway/X.25 PAD Off-Line Configurator.

New Transaction Gateway/X.25 PAD configurations can be downloaded at any time after the Transaction Gateway/X.25 PAD has come online. Downloading a new configuration will not affect any current calls unless the X.25 frame or packet level parameters were changed.

## **7. Redundancy and Load Sharing**

The Transaction Gateway provides redundancy and load sharing on a system and per card basis. They include Dual-Port V.35 I/O NIC Redundancy and Load Sharing, ARC Fail-over Redundancy Mechanism, and IP Redundancy

## **7.1 Dual-Port V.35 I/O NIC Redundancy and Load Sharing**

### **7.1.1 Load Sharing Between V.35 Ports**

The Transaction Gateway/X.25 PAD supports simultaneous input/output (I/O) to both V.35 ports on the V.35 NIC. For load sharing, the Transaction Gateway/X.25 PAD partitions the load between the two ports on a roughly equal basis.

### **7.1.2 Intraboard V.35 Port and X.25 Link Redundancy**

When both V.35 ports on the Dual-port V.35 NIC are used, the outgoing X.25 Switched Virtual Circuits (SVCs) are shared between the interfaces when the packet/frames are up on both. If either one goes down, the X.25 traffic is routed to the other. The transition is effective on a next-call basis. Calls are not preserved during the transition of a modem data path from one V.35 port to the other.

## **7.2 ARC Fail-over Redundancy Mechanism**

When two operational ARC boards are running the Transaction Gateway/X.25 application code in the same shelf, load sharing and automatic fail-over redundancy is supported. The ARC boards running Transaction Gateway/X.25 PAD share modems as follows: the ARC in the lowest numbered slot takes all the even numbered modem channels and the other ARC takes the odd numbered modems. Modem channel numbering begins at 0.

## **7.3 IP Redundancy**

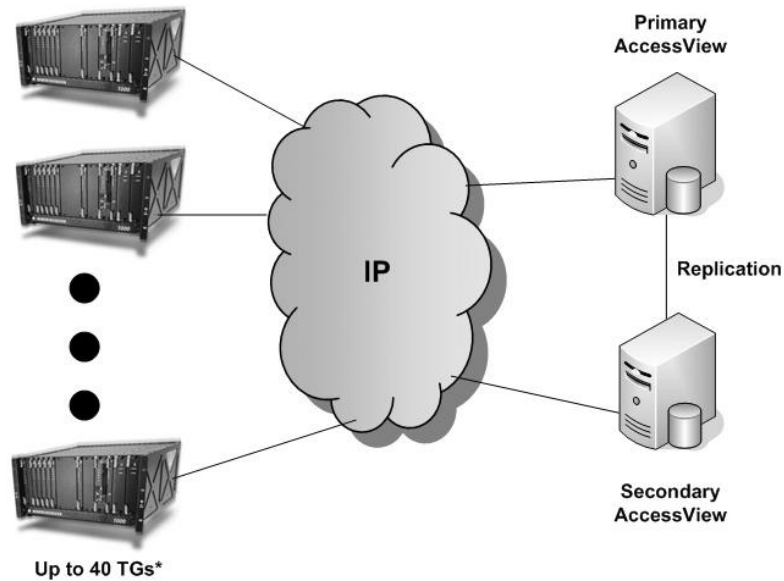
The TCP/IP configuration provides for a primary and a secondary host. If the primary host does not respond within the specified configured time frame, information is sent to the secondary host.

ARC supports IP network connectivity busy out feature. In this mode, the application continuously ping the target host. If no response is received for a period of time, the host is marked as down and the PSTN interfaces are busied out.

## 8. Transaction Gateway AccessView Accounting Server

AccessView is an integral part of transaction-processing gateway. AccessView captures accounting and network statistics from the Transaction Gateway (TG), and then processes and stores them in the database. The data captured by the accounting server can be used for the following operations:

- Transaction Accounting
- Customer Billing
- Transactions Monitoring
- Reports Generation

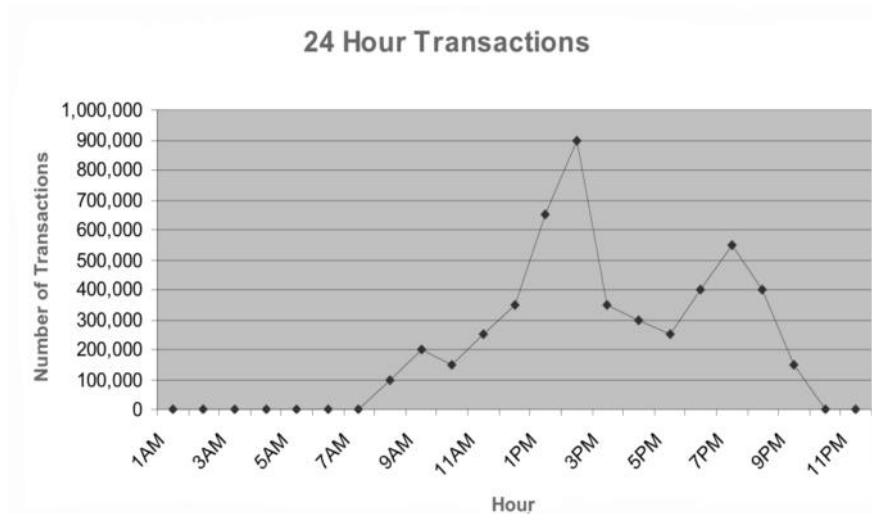


Refer TGAS application brief for detailed specification.

### 8.1 Real-Time Viewing of Data & Reports

Real-time data are recorded to AccessView at the end of each call. Customers can monitor and build a custom summary table using the most recent data on real-time. On a system-wide basis, transaction statistics can be used for traffic analysis according to time of day, system components, offered load, and transaction routes, to name a few applications.

AccessView provides the convenience to generate various reports for planning and monitoring purposes.



### 9. Summary

The UTStarcom Transaction Gateway enables fast transaction processing of credit card authorizations, debit card fund transfers, health benefit authorizations, electronic benefits transfers, and other communications involving single-session transfer of small amounts of data. Carrier class transaction network service providers can reduce CAPEX and OPEX by deploying TG for transaction processing over a legacy X.25 network or over the next generation IP network. The rich features in TG provide new revenue generating opportunities for the network service providers.

**Notes**

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