

# Universal Access System

## DSL Technologies — Making The Most of The Copper Loop

### Highlights:

- *Fast and cost-effective provisioning of advanced digital services*
- *Maximizing use of the existing 2-wire copper loop infrastructure*
- *Substrate to 2 Mbps rates on a single platform using G.shdsl, SDSL, IDSL, and HDSL technologies*
- *Fractional E1/T1 and multi-loop grooming services*
- *Full access multiplexing/grooming into multiple channelized E1/T1 pipes*



**The UAS Advantage — DSL** The General DataComm family of DSL products, called the Universal Access System (UAS) enables carriers to use 2-wire copper loops for connection to any switched or leased line service platform including PSTN voice, frame relay and ATM switches and backbone transport equipment for private line services. UAS is built for maximum equipment integration and global service provisioning on one platform.

**Reduced Facility and Hardware Costs** – Substrate through wideband services can be provided on existing 2-wire copper loops up to 6.5 km/ 21,400 ft. The same shelf can be used to provision G.shdsl, SDSL, IDSL, and HDSL services.

**Reduced Network Switch Costs** – The UAS 7000's ability to groom and multiplex N x 64 Kbps SDSL, IDSL, and HDSL loops into full T1/E1 reduces the number of ports needed on DACS, frame relay, or ATM switches.

**Lower Maintenance Costs** – TEAM®, the UAS's centralized network management system, provides performance monitoring, testing, and service verification for all equipment, both within the exchange office and at the customer location. Loop and equipment performance degradation and fault alarms are constantly monitored, leading to significantly reduced Mean Times To Repair.

### UAS Product Features

**The UAS 700 Series** uses High-Bit-Rate and Symmetrical Digital Subscriber Line (HDSL/S-

HDSL/G.shdsl) technology, an extension of DSL based on advanced digital signal processing.

A versatile range of access selections includes the following master units designed for the carrier central office:

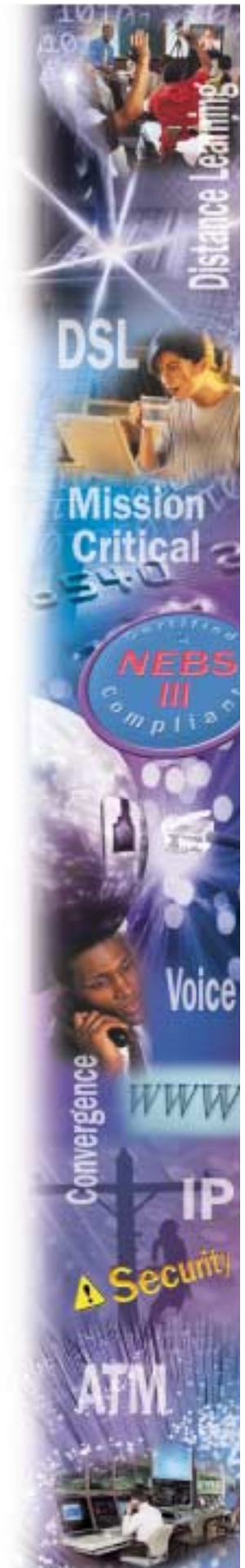
- The UAS 780-G2, 700A-G2 and 710-D2 for E1 applications
- The UAS 701-T2 for T1 applications.
- UAS 700 units are also available in remote powered configurations for unattended sites.

**The GT Series** provides DSL termination in a small footprint for the customer site.

- The GT 128, a low cost NTU with a universal V.35/X.21 interface (optional EIA/TIA-232-E).

The GT 1000/2000 Series, a cost-effective family of standalone, desktop NTUs with universal V.35/X.21/V.11 interfaces.

**The UAS 600 Series** are IDSL-based access and termination products ideal for 64/128 Kbps narrow-band service provisioning. They use the IDSL (ISDN Digital Subscriber Line) technology's innovative 2B1Q line coding and echo cancellation techniques to achieve full duplex 160 Kbps transmission on the local loop. From 160 Kbps, 128 Kbps is available as one or two 64 Kbps channels or a single 128 Kbps channel. The 600 Series provides economical and easily installed access to digital networks, or it can be directly connected to service platforms, such as a frame relay switch. At the customer premises, traditional DTE interfaces are pro-



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vided to the customer terminal equipment.

For the carrier office or central site, two IDSL access choices are available:

- The UAS 613 with three X.21 (V.11) user interfaces
- The UAS 611 with one V.35/V.24 interface

At the customer location, narrowband service is terminated using:

- The DC 612 NTU with two V.35 or optional X.21 interfaces
- The DC 621 NTU with one V.35/V.24 interface

The UAS 7000 Series enhances the UAS system by adding access multiplexing to the platform. Fully compatible with the 600, GT 128, and GT 1000/2000 Series remotes, the UAS 7000 allows carriers to

cost-effectively and efficiently feed customers into channelized frame relay, Digital Cross Connect, or even ATM networks without the need for an intermediate multiplexer. Network Interface Units (NIUs) rackmounted in the UAS shelf provide grooming and multiplexing of multiple 64/128 Kbps IDSL, S-HDSL, HDSL, or SDSL loop circuits into as many as eight E1/T1 pipes. UAS 7000 Drop Side Interface Units (DIUs) collocated with the NIUs, provide channel-side interfaces to DC 600, GT 128, or GT 1000/2000 Series standalones located at customer sites.

UAS 7000 NIUs include both E1 and T1 versions:

- The UAS 7001 for T1 multiplexing over one circuit

- The UAS 7002 for E1 multiplexing over one circuit

- The UAS 7022 for multiplexing over two E1 circuits

UAS 7000 LTUs include:

- The UAS 7616, a one slot unit for terminating up to three IDSL loops and the UAS 7616ML, which can interface to three ISDN terminal adapters.
- The UAS 7626, a one slot unit for terminating up to six IDSL loops
- The UAS 7722, a one slot unit terminating up to two S-HDSL loops
- The UAS 7723, a one slot unit terminating up to two SDSL loops

In addition, the UAS 7624, a two-slot combination NIU/LTU designed for higher density applications, has an integral T1 NIU and can concentrate up to 12 IDSL loops.

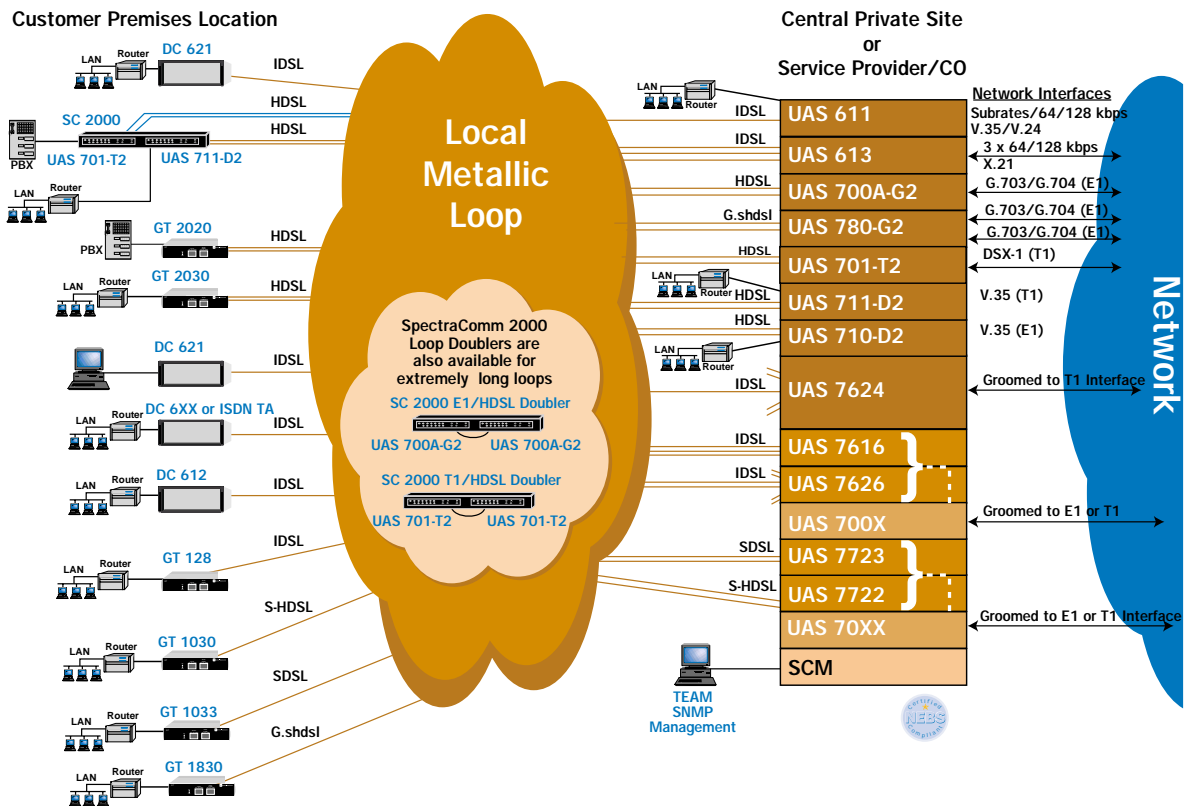


Figure 1 — UAS Overview

**Global Element Management with TEAM®** GDC's TEAM® Network Management provides customized element manager software packages for all UAS products, enabling complete, end-to-end management and total visibility to every circuit. All TEAM packages are SNMP-based and integrated into HP OpenView, providing an enhanced and intuitive graphical user interface. The Spectra-Comm Manager (SCM) acts as an SNMP proxy agent, monitoring up to 31 local shelf elements and their remotes. Automatic twenty-four hour monitoring of circuits for signs of degradation ensures an early warning of line problems. From a central location, operators can configure and test the individual modules; call up alarm details and reports; view the status of individual modules; and retrieve valuable configuration data, serial numbers, and firmware revision-level information.

**UAS Packaging** Central site UAS products can be rack-mounted in the UAS Shelves, a family of intelligent shelves that represent a technological breakthrough in communications packaging design. Offering high-density, universal rack-mounting for up to 16 transmission and network support products, the UAS shelves add a new dimension of flexibility and control, made possible by a modular three-zone bus-oriented backplane (Figure 3).

NEBS compliant, the UAS Shelves each occupy rack space of only 7 in. (178 mm) and a shallow 12 in. (305 mm). They can be flush or center-of-gravity mounted in standard 19 or 23-inch cabinets, which means they fit easily into existing installations. Two UAS Shelves can be linked together to form a 32-slot configuration. Each shelf can accept either one or two plug-in power supplies (AC or -48 VDC) enabling load sharing and redundancy. The power distribution system also permits redundancy using only three power supplies for two adjacent shelves.

At remote site installations, packaging choices include the compact GT desktop enclosure or two-slot SpectraComm 2000 Shelf shown in Figure 4. Other options are the one-slot DC or 10-slot Multipak.



Figure 2 — TEAM Shelf and Element Views

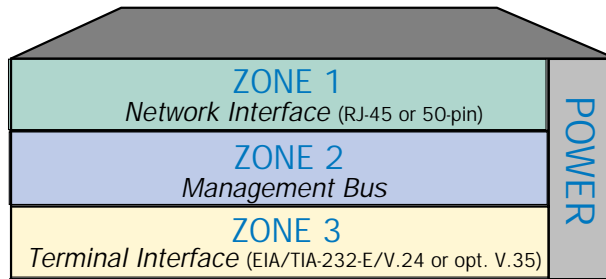
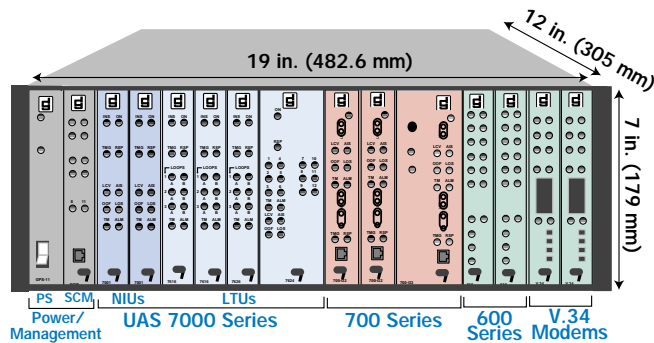


Figure 3 — UAS Shelf Front and Rear Views

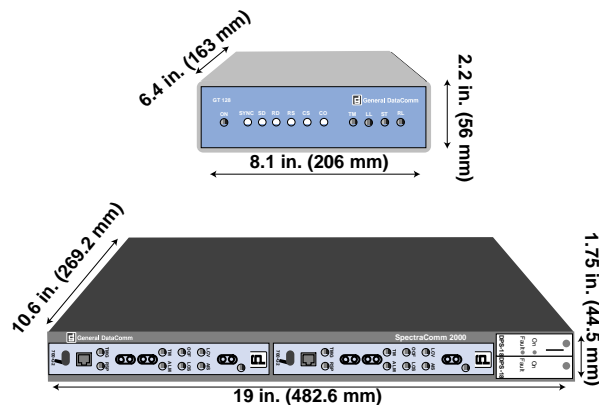


Figure 4 — GT Enclosure and SpectraComm 2000 Shelf

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### Key UAS Applications

#### E1 Narrowband Service Provisioning

Using the UAS 600 Series, and GT 128, service providers in E1 environments can maximize both the 2-wire loop and central office space for narrowband service provisioning. Up to 120 64/128 Kbps customer channels (loops) can be provisioned in one 14-inch, two-shelf system. A V.24 or V.35 subrate interface with a single IDSL loop and X.50-compatible framing provides data rates of 2.4, 4.8, 9.6, 19.2 and 48 Kbps as well as 64 and 128 Kbps.

For example, narrowband service is terminated in a GT 128 (single channel), DC 612 (dual channel), or DC 621 (single channel with X.50 subrates) NTU at customer locations (Figure 5). The NTUs connect directly to the customer's termi-

nal equipment using V.24, V.35, or optional V.11/X.21/RS-422 interfaces. At the carrier office, UAS 7616 DIUs or 600 Series NTUs provide IDSL access and 64/128 Kbps user data rates. The UAS 7002 supplies grooming and multiplexing into E1 interfaces. UAS 600 Series LTUs can also be directly connected to a frame relay network platform.

**E1 Service Provisioning** Alternately, for customers requiring full 2.048 Mbps service, a master 700A-G2 unit connected to a 700 Series HDSL NTU can combine the DS0s from two HDSL loops to form a 2.048 Mbps G.703/704 framed or unframed interface. In this arrangement, the 700 Series product will continue to operate if one of the two loops fails, providing reduced bandwidth service until the loop is restored.

**ATM Network Provisioning** When used with GT 1000/2000 units, the UAS provides a cost-effective means of provisioning dedicated ATM services for the many businesses needing high speed transport for their information networks (Figure 6). ATM switches support channelized E1/T1 interfaces and the UAS brings user traffic in very efficiently.

Comprehensive SNMP management gives the carrier complete control of the network to the customer premises. In addition, since UAS 7000 NIUs and LTUs communicate over the backplane, eliminating the need for external multiplexers, service providers will also save on equipment expenditures. Because UAS products use existing copper facilities, the carrier can offer new services now. There is no need to wait until fiber to the desk-

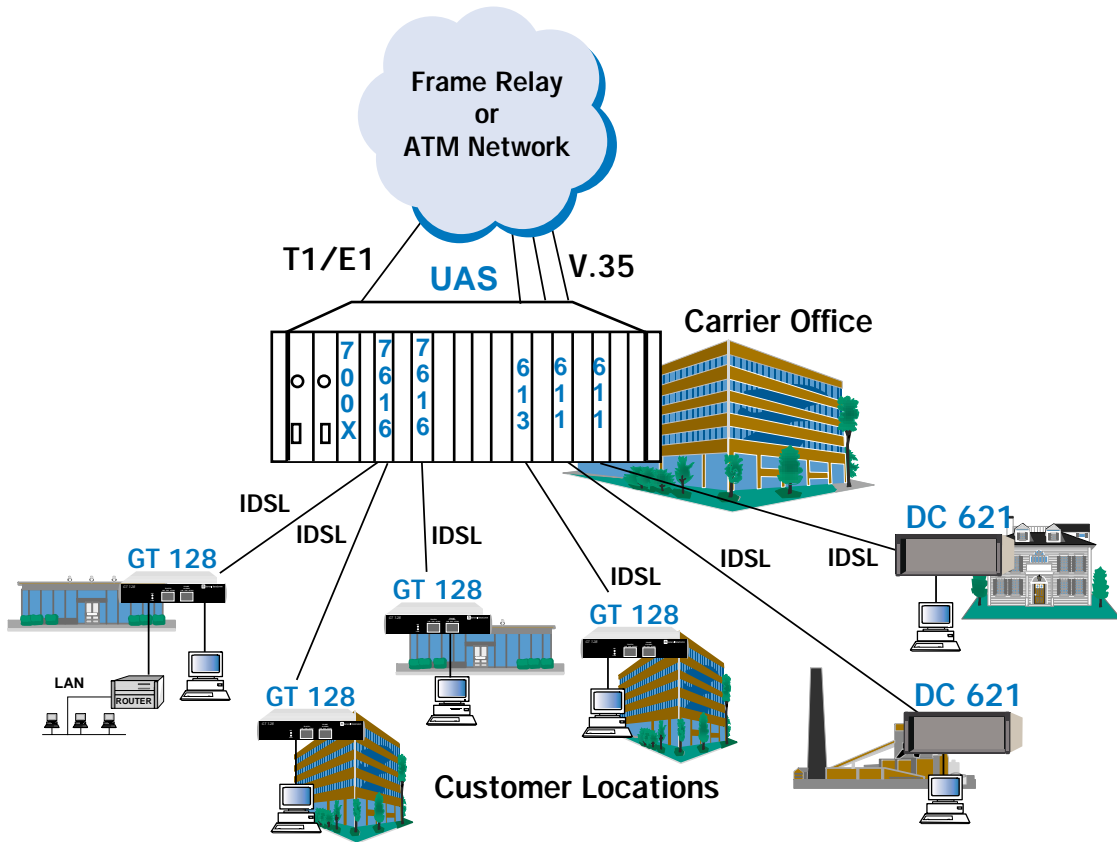


Figure 5 — Narrowband Service Provisioning

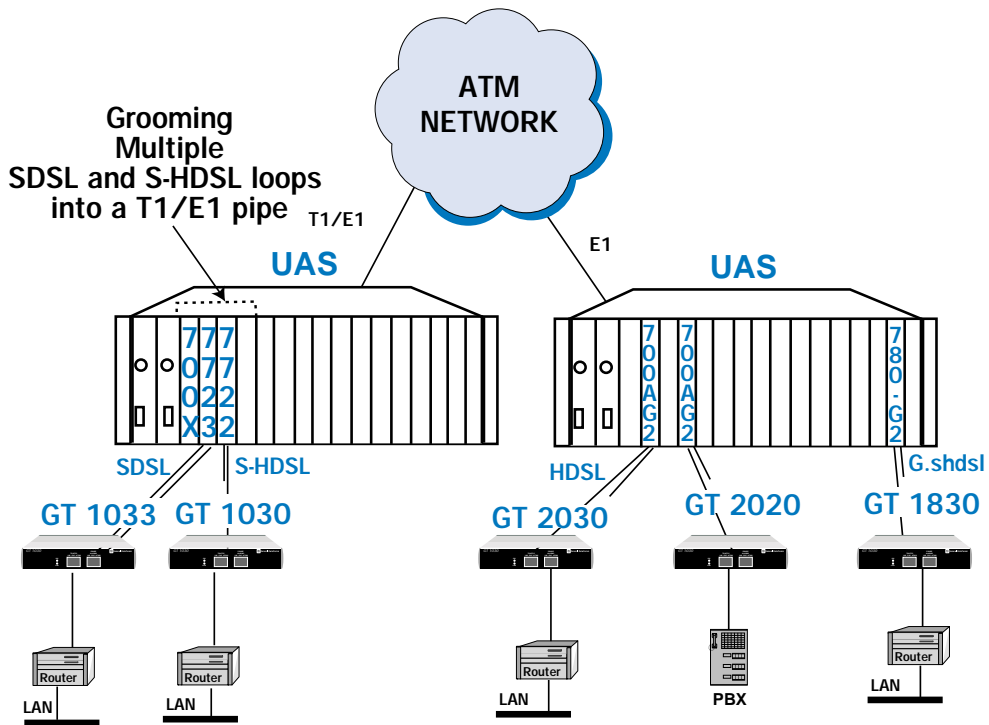


Figure 6 — ATM Provisioning

top has been installed. Finally, since new DSL technology is used, provisioning can be at local loop rates up to 2.048 Mbps.

**Internet Access Provisioning** Another new service possibility emerging for service providers is Internet access. In Figure 8, UAS 7000 Series products are combined with UAS NTUs to form a high speed dedicated path to an Internet Service Provider. Using UAS 7000 Series products, PTTs, carriers or CLECs can take advantage of the large installed base of copper loops and still be able to deliver high data throughput, again without investing in expensive fiber installation.

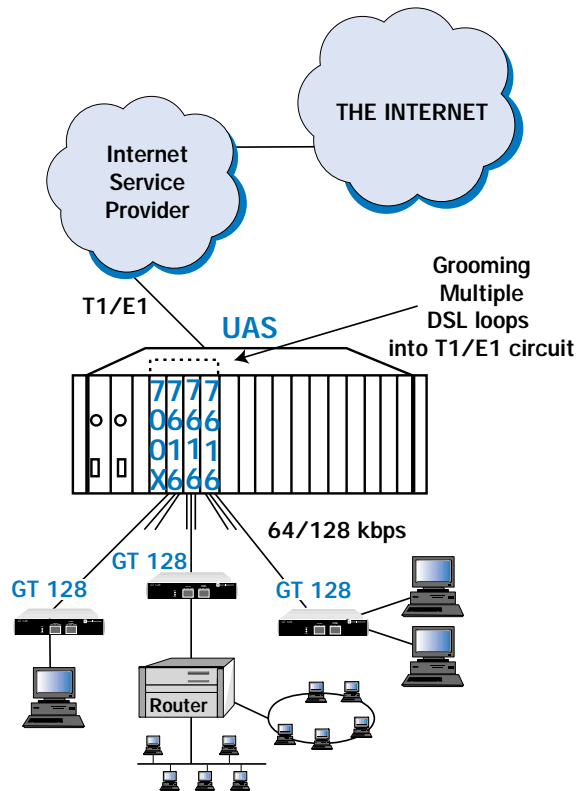


Figure 7 — Internet Access Provisioning

## Universal Access System

### UAS FAMILY AT-A-GLANCE

#### NARROWBAND ACCESS/TERMINATION - UAS 600 SERIES

Model Name	Card Slots	User Data Rate	Line Rate	User Interface	Encl.
DATX 2010	N/A	Up to 19.2 kbps sync/async	64 kbps	EIA/TIA-232E/V.24/V.28	VIP S/A Enclosure
DATX 2011	1	Up to 19.2 kbps sync 1.2 to 19.2 async	64 kbps	EIA/TIA-232E/V.24/V.28	UAS R/M Shelf
UAS 611	1	1 x 2.4 to 128 kbps	160 kbps	V.35/V.24; EIA/TIA-232E (Opt. X.21)	UAS R/M Shelf
UAS 613	1	3 x 64 kbps or 128 kbps	160 kbps	X.21	UAS R/M Shelf
DC 612	N/A	1 or 2 x 64 kbps or 1 x 128 kbps	160 kbps	V.35, EIA/TIA-232E	DC S/A Enclosure
DC 621	N/A	1 x 2.4 to 128 kbps	160 kbps	V.35, EIA/TIA-232E (Opt. X.21)	DC S/A Enclosure
GT 128	N/A	1 x 64 kbps or 1 x 128 kbps	160 kbps	V.35/X.21	GT S/A Enclosure

#### WIDEBAND ACCESS/SERVICE TERMINATION - UAS 700 SERIES AND GT SERIES

Model Name	Card Slots	User Data Rate	Line Rate	User Interface	Enclosure
UAS-700A-G2	1	1.152 Max	2 x 1168 kbps	G.703/704	UAS R/M Shelf
UAS 701-T2	1	1.536 Max	2 x 784 kbps	DSX-1	UAS R/M Shelf
UAS 710-D2	1	2.048 Max	2 x 1168 kbps	V.35/V.11	UAS R/M Shelf
UAS 711-D2	1	1.536 Max	2 x 784 kbps	V.35	UAS R/M Shelf
UAS 780-G2	1	2.048 Max	2 x 2056 kbps	2 x G.703/704	UAS R/M Shelf
GT 1020	N/A	1.152 Max	1 x 1168 kbps	G.703/704	GT S/A Enclosure
GT 1021 (Planned)	N/A	768 Max	1 x 784 kbps	DS-1/DSX-1	GT S/A Enclosure
GT 1030	N/A	1.152 Max	1 x 1168 kbps	V.35/X.21	GT S/A Enclosure
GT 1031 (Planned)	N/A	768 Max	1 x 784 kbps	V.35/X.21	GT S/A Enclosure
GT 1033 MR	N/A	1.536 Max	1 x 1552 kbps	V.35/X.21	GT S/A Enclosure
GT 1830	N/A	2.304 Max	1 x 2312 kbps	V.35/X.21	GT S/A Enclosure
GT 2020	N/A	2.048 Max	2 x 1168 kbps	G.703/704	GT S/A Enclosure
GT 2021 (Planned)	N/A	1.536 Max	2 x 784 kbps	DS-1/DSX-1	GT S/A Enclosure
GT 2030	N/A	2.048 Max	2 x 1168 kbps	V.35/X.21	GT S/A Enclosure
GT 2031 (Planned)	N/A	1.536 Max	2 x 784 kbps	V.35/X.21	GT S/A Enclosure

#### CENTRAL OFFICE OR CENTRAL PRIVATE SITE - UAS 7000 SERIES

Model Name	Card Slots	User Data Rate	Line Rate	Network Interface	Enclosure
Network Interface Units					
UAS 7001 T1	1	N/A	1.544.Mbps	DSX-1	UAS R/M Shelf
UAS 7002 E1	1	N/A	2.048 Mbps	E1 G.703	UAS R/M Shelf
UAS 7022 E1	1	N/A	2 x 2.048 Mbps	2 x E1 G.703	UAS R/M Shelf
Line Interface Units					
UAS 7616	1	3 x 64/128 kbps	160 kbps	N/A	UAS R/M Shelf
UAS 7616ML	1	3 x 64/128 kbps	160 kbps	N/A	UAS R/M Shelf
UAS 7626	1	6 x 64/128 kbps	160 kbps	N/A	UAS R/M Shelf
UAS 7722	1	2 x 768 kbps	2 x 1.168 Mbps	N/A	UAS R/M Shelf
UAS 7723 MR	1	.768 M Max	1 x 784 kbps	N/A	UAS R/M Shelf
UAS 7624	2	12 x 64/128 kbps	160 kbps	DS-1/DSX-1	UAS R/M Shelf

#### Customer Site

UAS 7616 and 7626 interface with the DC 600 Series or GT 128

UAS 7722 interfaces with GT 1000/GT 2000 Series

## Specifications

Functional	UAS 600 Series/GT 128	UAS 700 Series/GT 1000/2000
Signal Format:	Full Duplex 160 Kbps, 2B1Q line code per ANSI T1.601	Full Duplex 1168 Kbps, 2B1Q line code per ETSI ETR/TM-3036, Bellcore TA-NWT-001210
Framing Options:	N/A	G.704, ESF with ANSI or 54016 statistics, SF, or unframed
Operating Range:	6 km @ .4 mm (20K ft. @ 26 ga.) 8.5 km @ .5 mm (28K ft @ 24 ga)	3.7 km @ .4 mm (12K ft. @ 26 ga) 6 km @ .5 mm (20K ft.@ 24 ga)
Mode:	612/613: Sync, 621/611: Async, Sync (2.4, 4.8, 9.6, 19.2 Kbps Sync or Async; 64 or 128K Sync)	Sync/Async
Diagnostics:	Front panel switches and centralized, remote-controlled diagnostics	V.24/V.28 port for terminal access to built-in maintenance and diagnostics, including loopbacks, performance history, and configuration control
Network Management:	SNMP	SNMP
Functional	UAS 780-G2/GT 1830	UAS 7723/GT 1033
Signal Format:	Full Duplex multirate (200-2056 kbps in 64 kbps increments) TC-PAM-16 line code per ITU-T G.991.2 (Formerly G.shdsl)	Full Duplex multirate (128 - 768 kbps in 64 kbps increments); 2B1Q line code per ETSI TS101524
Framing Options:	N/A	N/A
Operating Range:	21.4 kft/6.5 km @ 264 kbps (26 AWG/0.4 mm) 19.9 kft/6.0 km @ 392 kbps (26 AWG/0.4 mm) 14.2 kft/4.3 km @ 1544 kbps (26 AWG/0.4 mm) 13.0 kft/3.9 km @ 2056 kbps (26 AWG/0.4 mm)	15.4 kft/4.7 km @ 272 kbps (26 AWG/0.4 mm) 15.1 kft/4.6 km @ 400 kbps (26 AWG/0.4 mm) 12.9 kft/3.9 km @ 768 kbps (26 AWG/0.4 mm)
Mode:	Synchronous	Synchronous
Diagnostics:	V.24/V.28 craft port for VT100 access to built-in maintenance and diagnostics, including loopbacks, performance statistics, alarms, and configuration control	V.24/V.28 craft port for VT100 access to built-in maintenance and diagnostics, including loopbacks, performance statistics, alarms, and configuration control
Network Management:	SNMP	SNMP
Physical and Environmental UAS 600/700 and GT Series		
Dimensions:	DC Enclosure: 99 mm (3.9 in.) H x 277 mm (10.9.) W x 318 mm (12.5 in.) D GT Enclosure: 56 mm (2.2 in.) H x 206 mm (8.1 in.) W x 163 mm (6.4 in.) D SC 2000 Enclosure (2 units): 44.5 mm (1.75 in.) H x 483 mm (19.0 in.) W x 269.2 (10.6 in) D Multipak (10 units): 229 mm (9.0 in.) H x 343 mm (13.5 in.) W x 292 mm (11.5 in.) D UAS Shelf (16/8 units): 179 mm (7.0 in.) H x 483 mm (19.0 in.) W x 305 mm (12 in.) D	
Power Requirements:	100-240 VAC (50-60 Hz) 15W max. (612 /621 standalone), 10W max. (612/621 rackmount), 6W max. (611/613 rackmount)	
Operating Temperature:	0-50° C (32-122° F)	
Humidity:	Up to 95% without condensation	
Compliance:	UL listed/recognized and CSA approved CE Mark, EN 60950, EN 55022 Class A	

## Universal Access System

### Specifications (Continued)

Functional	UAS 7001 NIU	UAS 7002/UAS 7022 NIUs
Service Compatibility:	T1 and Fractional T1	E1 and Fractional E1
Electrical Interface:	1.544 Mbps, DSX-1 (ANSI T1.102), DS-1 (ANSI T1.403)	2.048 Mbps (G.703)
Line Code:	B8ZS or AMI	HDB3
Framing:	Superframe, Extended Superframe	G.704 Framing
Multiframe Performance		
Reporting:	TR 54016, ANSI T1.403	Per pR 300 417-1-1 and G.826
Receiver Range:	0 to 6 dB; 6 to 43 dB extended	0 to 6 dB; 6 to 43 dB extended
One's Density Enforcement:	8 (N + 1) for AMI line code	N/A
Redundancy:	Element redundancy or diverse routing	Element redundancy
Network Management:	SNMP	SNMP
Diagnostics:	Line Loopback, Payload Loopback, Local Loopback; Self Test patterns: 511, 2047, or 1 in 4	Line Loopback, Payload Loopback, Local Loopback

Functional	UAS 7616/7626 DIUs	UAS 7722 DIU	UAS 7624 DIU/NIU
Signal Format:	Full duplex 160 Kbps, 2B1Q line code per ANSI T1.601	Full Duplex 1168 Kbps, 2B1Q line code per ETSI ETR/TM3036	Full duplex 160 Kbps, 2B1Q line code per ANSI T1.601
Operating Range:	6 km @ .4 mm (18K ft @ 26 ga)	3.7 km @ .4 mm (12K ft. @ 26 ga) 6 km @ .5 mm (20K ft @ 24 ga)	6 km @ .4 mm (18K ft @ 26 ga)
Diagnostics:	Local Loopback (2B+D), Digital Loopback	V.24/V.28 port for terminal access to built-in maintenance and diagnostics, including loopbacks, performance history and configuration control	Local Loopback (2B+D), Digital Loopback
Electrical Interface:	N/A	N/A	1.544 Mbps, DSX-1 (ANSI T1.102), DS-1 (ANSI T1.403)
Line Code:	N/A	N/A	B8ZS or AMI
Framing:	N/A	N/A	Superframe, Extended Superframe
Ones Density Enforcement:	N/A	N/A	8 (N + 1) for AMI
Performance Reporting:	Per G.821	Per G.821	TR 54016, ANSI T1.403

#### Physical and Environmental

#### UAS 7000 Series

Dimensions	UAS Shelf: 178 mm (7 in.) H x 483 mm (19 in.) W x 305 mm (12 in.) D Multipak: 229 mm (9 in.) H x 343 mm (13.5 in.) W x 292 mm (11.5 in.) D
Power Supplies:	1 or 2 for redundancy
Power Requirements:	100/120 VAC; 220/240 VAC; -48 VDC. 96W max
Operating Temperature	0° to 50° C (32° to 122° F)
Humidity:	5% to 95% (non-condensing)
Compliance:	UL 1950, CSA-C22.2 #950, EN60950 FCC Part 15, Class A, EN55022; UL 94V0

NOTE: Some products, features, and options described may still be in development.

#### World Headquarters

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