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
- Subrate 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 Data-Comm 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 – Subrate 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 narrowband 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-



Universal Access System

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.





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 SNMPbased 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 rackmounted 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.







 Network Interface (RJ-45 or 50-pin)
 POUND

 ZONE 2
 Management Bus

 ZONE 3
 Terminal Interface (EIA/TIA-232-E/V.24 or opt. V.35)





General DataComm

Universal Access System

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 terminal 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



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 6 — ATM 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/asyn	с	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 12	8 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 kb	ps	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 116	8 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 116	8 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 205	6 kbps	2 x G.703/704	UAS R/M Shelf			
GT 1020	N/A	1.152 Max	1 x 116	8 kbps	G.703/704	GT S/A Enclosure			
GT 1021 (Plannee	d) 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 116	8 kbps	V.35/X.21	GT S/A Enclosure			
GT 1031 (Plannee	d) 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 155	2 kbps	V.35/X.21	GT S/A Enclosure			
GT 1830	N/A	2.304 Max	1 x 231	2 kbps	V.35/X.21	GT S/A Enclosure			
GT 2020	N/A	2.048 Max	2 x 116	8 kbps	G.703/704	GT S/A Enclosure			
GT 2021 (Planned	d) 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 116	8 kbps	V.35/X.21	GT S/A Enclosure			
GT 2031 (Planned	d) 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 Slot	s User Data Rate	Line Ra	te	Network Interface	Enclosure			
		ſ	Vetworl	K Interface U	nits				
UAS 7001 T1	1	N/A	1.544.N	/lbps	DSX-1	UAS R/M Shelf			
UAS 7002 E1	1	N/A	2.048 N	/lbps	E1 G.703	UAS R/M Shelf			
UAS 7022 E1	1	N/A	2 x 2.04	48 Mbps	2 x E1 G.703	UAS R/M Shelf			
Line Interface Units									
UAS 7616	1	3 x 64/128 kbps	160 kbj	ps	N/A	UAS R/M Shelf			
UAS 7616ML	1	3 x 64/128 kbps	160 kbj	os	N/A	UAS R/M Shelf			
UAS 7626	1	6 x 64/128 kbps	160 kbj	os	N/A	UAS R/M Shelf			
UAS 7722	1	2 x 768 kbps	2 x 1.10	68 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 kbi	DS	DS-1/DSX-1	UAS R/M Shelf			
			Cu	stomer Site					
UAS 7616 and 7626 interface with the DC 600 Series or GT 128									
UAS 7799 inter	faces with C	T 1000/GT 2000 Sarias							
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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 Environm	uental 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 T1.10	02), DS-1 (ANSI T1.403)	2.048 Mbps (G.703)				
Line Code:	B8ZS or AMI	HDB3					
Framing:	Superframe, Extended Superframe	5	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 ro	uting	Element redundancy				
Network Management:	SNMP		SNMP				
Diagnostics:	Line Loopback, Payload Loopbac Self Test patterns: 511, 2047, or 1	k, Local Loopback; 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:	2: 6 km @ .4 mm (18K ft @ 26 ga) 3.7 km @ .4 mm (12K ft. @ 26 6 km @ .5 mm (20K ft @ 24 g		6 ga) 6 km @ .4 mm a) (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 histor and configuration control	Local Loopback (2B+D), Digital Loopback y				
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:	ng: 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 Environmen	tal UAS 70	000 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						

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

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