



DM4600

IPSAN – IP MULTISERVICE ACCESS PLATFORM

DATASHEET

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THE IDEAL SOLUTION WHETHER BUILDING NEW NETWORKS, SCALING UP OR TRANSITIONING FROM LEGACY ONES

Along with the modernization of existing telecommunication networks, operator companies face the transition challenge from legacy TDM based networks into full IP networks.

Thinking on this demand, Datacom offers the product line IPSAN – IP Service Access Node. Named DM4600, this line offers an innovating solution that allows its application in scenarios such as new-generation access networks assembly, modernization of existing networks and legacy-networks evolution in equipment obsolescence scenarios.

IPSAN is a flexible and modular platform that is ideal for converging networks. Natively operates with Ethernet/IP and TDM, offering complete solutions for legacy network migration to purely IP networks.

The assembly of new access networks, using copper or fiber, is possible with the DM4600 family through the GPON, VDSL, ADSL, G.SHDSL EFM and POTS technologies.

For a smooth transition from legacy networks, a wide range of TDM features can be used by DM4600 products, such as cross-connection between interfaces, CAS Grooming, remote elements management and diagnosis and adaptation on data link layer of TDM networks (PPP, MLPPP and Frame Relay) into Ethernet.

This way, it is possible to keep balance between earnings with the existing services on the legacy network and the urge for network evolution with IP technology.

TRIBUTARY INTERFACES

- GPON card with 8 ports, each port with up to 128 users
- VDSL card with 72 ports VDSL2
- ADSL card with 72 ports, compatible with ADSL2+, ADSL2 and ADSL
- G.SHDSL EFM card with 48 ports
- POTS card with 72 voice ports
- Channelized STM-I card with 1 port (63 EI ports)
- Through ICAD-705, it is possible to use EI, G.SHDSL TDM and V.35 cards from DM705 on IPSAN platform
- Ethernet ports on GPC card

SCALABILITY

- Up to 320Gbit/s of switching capacity
- Up to 112 GPON ports
- Supports PON Link split of up to 1:128
- Up to 1008 ADSL2+, VDSL2 or POTS ports
- Up to 672 SHDSL ports
- Up to 448 EI ports
- Up to 14 STM1 ports
- Up to 8 1/10Gbit/s Uplink ports

MAIN FEATURES

DM4680

- 1 IU chassis for 19" rack installation
- Provides 18 slots: 2 for power supply, 1 for GPC, up to 2 for MPU and up to 14 for interface cards
- Backplane with up to 10Gbit/s per interface card, non-blocking architecture
- Every control, interfaces, fan and power supply modules are hot-swappable
- Compatible with all DM4600 modules

DM4650-HS

- 5U chassis for 19" rack installation
- Provides 10 slots: 2 for power supply and fan control, 1 for GPC, up to 2 for MPU and up to 6 for interface cards
- Backplane with up to 10Gbit/s per interface card, non-blocking architecture
- Every control, interfaces, fan and power supply modules are hot-swappable
- Compatible with all DM4600 modules

PROCESSOR UNIT (MPU)

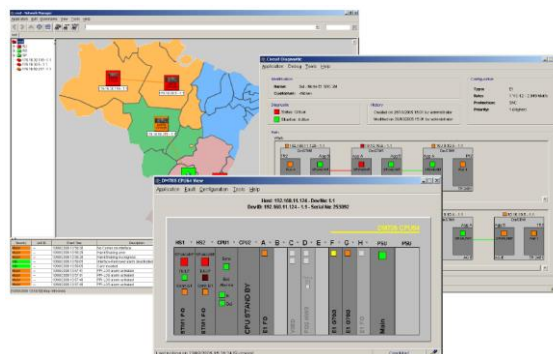
- Features central control, management and switching system
- Allows redundant operation (1:1)
- Implements 8 QoS queues. Including HqoS on MPU10 card
- Features Gigabit and 10 Gigabit Ethernet ports (SFP/SFP+)
- Out-band and in-band management

INTERFACES

- Modular, flexible and with universal slot concept
- GPON interface with 1:128 split PON Link capable and PON Link Protection Switching
- VDSL2, ADSL2+, G.shdsl (TDM/EFM), channelized STM1, EI and V.35 interfaces support
- 1Gbit/s and 10Gbit/s Ethernet uplinks

MANAGEMENT

- Support for centralized network management through DmView
- Allows ACL management, specifying IP addresses list
- Out-band and in-band management



SYNCHRONISM SOURCES

- External clock input of 2048 KHz on GPC card
- Regenerated clock from EI, G.SHDSL, STM-1 and V.35 interfaces connected to the TDM network
- Internal clock generated by the equipment

SECURITY

- Access control administrators (ACL) rules
- Local and remote Syslog
- Users authentication, authorization and accounting (AAA)
- Supports RADIUS and TACACS+

POWER SUPPLY

- DC full range (-36 to -72 VDC)
- Redundant power supply inputs

DMVIEW

INTEGRATED NETWORK MANAGEMENT SYSTEM

- User-friendly graphic interface
- Visualization of equipment through topological maps, with ease creation of sites and links
- End-to-end provisioning, for point-to-point and multipoint circuits, over different technologies like PDH, SDH, Metro Ethernet, SHDSL and GPON
- Equipment bayface visualization and monitoring, allowing a clear identification of the operation status and active alarms
- Performance management with customizable reports
- Northbound integration, including SNMP forwarding and inventory scheduled exports
- Support for high availability clusters and enterprise servers

IPSAN BENEFITS FOR SMART CITIES

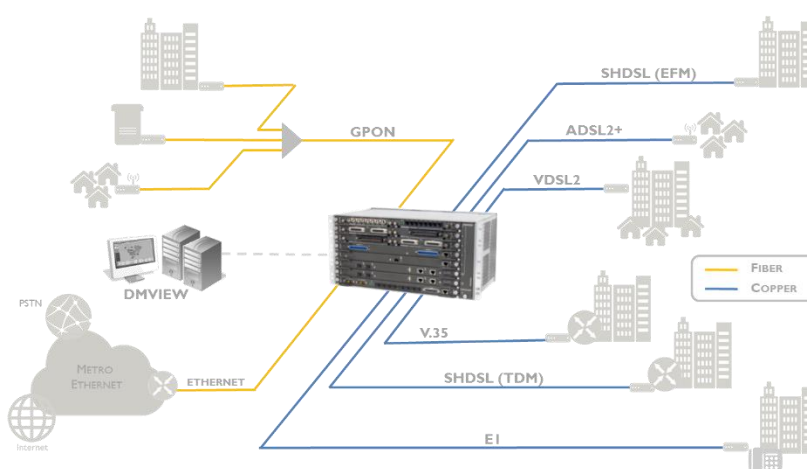
- Modernization of public administration
- Integration of direct and indirect institutions
- Presence in remote districts of the public administration
- Internet access to micro enterprises, creating business opportunities
- Interconnection with emergency services such as Fire and Civil Defense
- Educational labs with internet access
- Remote Surveillance
- Services of local or institutional news through TV over the metropolitan network

APPLICATIONS

BROADBAND ACCESS AND LEGACY NETWORK

The DATACOM IPSAN solution provides passive optical access based on standardized GPON technology that allows operators to deploy fiber-based services to the home, business or curb. In GPON networks, users can share one fiber connection. This makes GPON a great choice for service providers wanting to expand service network coverage or replace already deployed copper networks with fiber, particularly in high-density urban areas.

The DM4600 Series also leverages existing metallic infrastructure investment and supports broadband access with VDSL2 and ADSL2+ technologies. For symmetric applications, the SHDSL.bis standard usage allows "Ethernet-First-Mile" access speeds of up to 5.7 Mbit/s per port over the copper infrastructure. Using pair bonding, speeds up to 22.8 Mbit/s can be achieved.



The IPSAN DM4600 enables legacy technology to co-exist harmoniously with modern networks on an Ethernet platform. The IPSAN allows link protocol conversion in existing TDM channels (PPP, Frame Relay or MLPPP Nx64k/Nx2M) to Ethernet including QoS applications. In addition, the IPSAN allows traffic aggregation from multiple underutilized TDM channels into a single TDM 2Mbit/s channel from any of its interfaces.

SMART CITIES INFRASTRUCTURE

Cities are the center of modern society and they are becoming more complex each day. Technology can make life better and easier, empowering the universalization of public services. However, the government should not only pay attention to a network for digital inclusion but it also should deploy a high-performance network that foment the city development.

The DM4600 deployment associated to the DATACOM Ethernet Switches is a valuable cost-effective solution for smart cities. It avoids restrictive solutions mainly regarding to features, management and performance. DATACOM IPSAN delivers a variety of access technologies, such as GPON, VDSL and ADSL, that easily fits to citizens and public offices needs.

METRO ETHERNET INTEGRATION

The Metro Ethernet technology is a high capacity, flexibility and availability network. It is an ideal model to operate different services and traffics for service providers, with full isolation and bandwidth control. Ethernet access is part of a Metro Ethernet solution, attaching end-users to Ethernet based aggregation and core packet transport networks.

The IPSAN features and functions are compatible with Metro Ethernet networks, allowing to deliver Ethernet connectivity for residential, businesses and mobile nodes onto the same platform. With this approach, operational flexibility, improved customer reach and reduced deployment capital expenditure can be achieved, becoming an attractive solution for operators and service providers.

FEATURE LIST

MANAGEMENT

- SNMP v1/v2c/v3
- Web Interface
- Software update roll-back
- File transfer via TFTP (Firmware, Config and Logs)
- Telnet
- SSHv2
- Syslog
- Port Mirroring
- SNTP
- In-Band and Out-Band Management
- Support to multiple saved configuration files

VLAN SUPPORT

- Q-in-Q
- VLAN Tagging
- VLAN Stacking
- Private VLAN

L2

- Up to 1000 Multicast groups (IGMPv1,2,3)
- IGMP snooping with proxy report
- STP, RSTP and MSTP
- IGMP Fast Leave

AUTHENTICATION

- RADIUS
- TACACS+

SECURITY

- DHCP Option 82
- PPPoE
- MAC and IP Filter
- MAC Spoofing
- MAC Flooding
- Broadcast and Multicast Storm Control
- Anti IP Spoofing
- Per port MAC Limit (only for MPU10)

IPv4

- Static IP Address

IPv6

- Static IP Address
- NDP
- DHCPv6

TDM

- PPP
- Frame Relay
- MLPPP (n x 2M and n x 64k)
- V.35
- E1
- Channelized SDH
- Cross-connect
- CAS grooming
- Support to clock recovery from tributary ports
- IPv4/IPv6 Dual Stacking (only for MPU10)

GPON

- Split ratio 1:128
- Forward Error Correction (FEC) Upstream and Downstream
- SBA and DBA (Dynamic Bandwidth Allocation)
- T-CONT types 1, 2, 3, 4 and 5
- VLAN Mapping per GEM Port
- FTTd (hairpinning)
- PON Link Redundancy Type B
- ONT Management and Control Interface (OMCI)
- Remote ONU FW Upgrade
- Automatic ONU Rogue Detection and Isolation
- ONU Authentication configuration by Serial Number, Password or both
- MAC limit per ONU
- Port Range
- Class B+ (28dB) and C+ (32dB) support
- Reaches up to 20km of distance
- AES-128 encryption
- SIP VoIP FXS support
- IPv6 support
- Counters per GEM port
- Status Reporting (SR) and Non-Status Reporting (NSR)
- Transparent LAN Service (TLS) support
- Supports VLAN+PBIT traffic

QOS

- 8 queues (2 Low Latency Queues - LLQ)
- Traffic Classification by: P-bit (802.1p), DSCP (Diffserv), VLAN ID and Ethertype
- Scheduling Types: Strict Priority (SP), Weighted Round Robin (WRR) and Mixed WFQ
- 64k bytes of Bandwidth Granularity

ADSL

- ADSL, ADSL2 and ADSL2+ annexes A, I, L and M
- SELT and DELT line test
- Power Saving Modes (L0/L2/L3)

VDSL

- Profiles 8a, 8b, 8c, 8d, 12a, 12b, 17a, 17b support
- Bandplans 997 and 998 support
- SELT and DELT line test
- ADSL automatic fallback (ADSL, ADSL2 and ADSL2+)
- Symmetric and Asymmetric access rates with up to 100 Mbits/s downstream

SHDSL

- Any port bonding up to 4 pairs
- Ethernet First Mile
- Support to SHDSL.bis

POTS

- SIP Protocol support
- Supplementary Services

ETHERNET

- Link Aggregation (LAG/LACP)
- Half and Full Duplex support on Ethernet interfaces
- Auto-negotiation support on Ethernet interfaces
- Dual rate 1/10GbE SFP+

STANDARDS AND PROTOCOLS

IEEE

802.1ad	Double tag
802.1p	Traffic Class Expediting and Dynamic Multicast Filtering
802.1q	Trunk mode
802.3ad	Link Aggregation
802.3ae	10 Gigabit Ethernet
802.3z	Gigabit Ethernet

ITU

G.164	Echo Suppressors
G.168	Echo cancellers
G.711	Pulse code modulation (PCM) of voice frequencies
G.722.1	Coding at 24 and 32 kbit/s for hands-free operation
G.722.2	Coding of speech at around 16 kbit/s using AMR-WB
G.723.1	Coding of speech at 5.3 and 6.3 kbit/s
G.726	40, 32, 24, 16 kbit/s ADPCM

ITU (CONTINUATION)

G.729 A,	Coding of speech at 8 kbit/s using CS-ACELP
B and A/B	GPON General Characteristics
G.984.1	GPON Physical Media Dependent
G.984.2	GPON Physical Media Dependent
G.984.3	Transmission convergence
G.984.4	GPON ONT Management and Control Interface
G.988	OMCI
G.991.2	SHDSL BIS
G.992.1	G.DMT
G.992.2	G.LITE
G.992.3	ADSL2
G.992.4	ADSL2 Splitterless
G.992.5	ADSL2+
G.993.2	VDSL2
G.994.1	Handshake procedures for DSL transceivers
L.20	Fire security code for telecommunication facilities

ITU (CONTINUATION)

K.21	Resistibility to overvoltages and overcurrents
Q.551	Transmission characteristics of exchanges
Q.552	Transmission characteristics at 2-wire analogue

IETF

RFC791	Internet Protocol
RFC 1112	IGMP v1
RFC 2236	IGMP v2
RFC2460	Internet Protocol, version 6
RFC 3261	SIP
RFC 3376	IGMP v3

ANATEL - TELEBRÁS

SDT 220-250-701
SDT 220-250-706
SDT 220-250-701

DM4600 ACCESSORIES

Accessory	Description
AD-TL64 800.0289.02	TELCO 64. 50 OHMS ADAPTER. EI tributary coaxial cable adapter for DM705-EI-16, DM800-IC32EI and DM800-IC32EIP boards. Allows the connection of 16 EI interfaces on each AD-TL64 directly cabled for DID and no need for intermediary connections.
CB-DB44M-XX M CONSULT FOR PART NUMBER	22 PAIRS CABLE WITH MALE DB44 CONNECTOR. 22 pairs cable with DB44 connector in one end and open on another. Available in different lengths: 5, 10, 15, 25 meters.
CB-DB44M-3DB25F CONSULT FOR PART NUMBER	ADAPTER CABLE DM44M - 3xDB25F (DM705-6V35). Designed to be used with RB-04. It has a DB44M connector to be linked with 6V35 and 3 DB25F connectors. This way, each of the V.35 interfaces shows itself on female DB25 connector with ISO 2110 Amd.I pin-outs, RS-530 compatible.
CB-DG-T50M-XX M CONSULT FOR PART NUMBER	24 PAIRS CABLE WITH MALE TELCO50 CONNECTOR. 24 pairs cable with male Teco50 connector with output at 90° in one end and open on the other. Available in different lengths: 5, 10, 20, 30, 40 e 50 meters.
CO-TL64 710.0142.00	TELCO 64 CONNECTOR. Telco64 connector to crimp cables. Used for EI tributary cables connection at 120 Ohms for DM705-EI-16, DM800-IC32EI and DM800-IC32EIP boards.
DM4600-BP-IC 800.0853.01	BLANK PANEL FOR IC AND MPU SLOTS. Blank panel to ensure proper closure and avoid access. Fits Interface cards and MPU slots of IPSAN products line (DM4600).

Accessory	Description
MA-19 DM4650 HS 800.0960.00	SUPPORT FOR CABLE FIXATION. Support to organize handling and disposal of cables on the equipment, turning it easy to insert and remove interface boards.
MA-21 - DM4650 800.0982.00	CHASSIS VERTICAL FIXATION SUPPORT SET. A steel made adapter set to assemble up to 2 (two) DM4650 HS chassis at vertical position in a standard 19" rack. Additionally includes integrated functionalities to the set in order to deflect heat and provide structure for cable fixation and organization.
RB-04 800.0246.00	19" ADAPTER PANEL FOR DM705-6V35 MODULE CABLES. RB-04 is an adapter that allows connecting DB44 connectors to a panel with 6 DB25 connectors. Each one of the V.35 interfaces presents itself in a female DB25 connector with ISO2110 Amd.I pin-out, RS530 compatible. This adapter has standard dimensions, with 0,5 U (height unit), ready to be installed in 19" frames.
RB-09 CONSULT FOR PART NUMBER	CONNECTION PANEL: 16 X EI TRIBUTARIES TO 64-PINS TELCO CONNECTOR 19" frame panel with 1U (height unit) with 16 x G.703 2 Mbit/s interface ports and 1,5m or 3m cable with 64-pins TELCO connectors for DATACOM equipments interconnection.
RB-20 800.5017.00	CONNECTION PANEL: 16 X EI 120OHMS TRIBUTARIES TO 75OHMS DID STANDARD. 19" frame panel with 1U (height unit) with 16 x G.703 2Mbit/s 120ohms interface ports with crimping connectors for twisted pairs and 16 x 75ohms coaxial connector ports (Telebrás standard).

DM4600 FAMILY MODULES

MODULE	DESCRIPTION	
DM4600 – MPU20 800.0974.01	Provides switching matrix and IPSAN main control functions, operating on redundant mode with a switching capacity of 320Gbit/s. MPU20 is recommended in scenarios with high density of GPON boards, which require higher uplink capacity. Front panel with 4x1/10Gbit/s dual rate SFP+, 1xMGMT ETH and 1xConsole.	
DM4600 – MPU10 800.0624.07	Performs system control, switching, management, logging and storage functions for DM4600 family. MPU10 can operate under redundant mode, allowing a high-availability system. It provides configuration, failure, inventory and firmware management functions. Front panel with 2x1Gbit/s SFP, 1xMGMT ETH and 1xConsole.	
DM4600 – 8-GPON 800.0978.03	Allows optical passive network assembly for FTTx applications. With a compatible solution for ITU's GPON standards, IPSAN provides an effective way to supply fiber-to-the-home services. Front panel with 8 x GPON ports, compatible with standards G.984.1, G.984.2, G.984.3 and G.984.4 (OMCI). Supports B+ and C+ SFP classes.	
DM4600 – 72-VDSL 800.0968.00	Offers an ITU standard compatible solution, IPSAN comes as an effective way to increase speed demands, providing up to 100 Mbit/s rates. It is a 72 x VDSL2 ports line card compatible with G.992.1, G.992.3, G.992.5, G.993.2 and G.994.1 standards. Supports automatic fallback to ADSL, ADSL2 and ADSL2+ legacy standards.	
DM4600 – 72-ADSL 800.0622.04	ADSL2+ module allows deployment of broadband networks over available copper infrastructure. It also supports ADSL legacy modes (ADSL and ADSL2). Provides 72 x ADSL ports line card, compatible with ADSL2+, ADSL2, ADSL, G.Lite and G.DMT, compatible with ITU G.992.1/2/3/4/5 Annex A, G.992.3 Annexes I and L and G.992.3/5 Annex M.	
DM4600 – 48-SHDSL 800.0900.03	The SHDSL EFM module allows the implementation of Ethernet in the First Mile networks using the available copper of the existing infrastructure. Provides 48 x G.SHDSL (SHDSL.bis) ports line card, compatible with ITU-T G.991.2 G.SHDSL and G.994.1 (G.Handshake) standards. Supports SHDSL.bis and bonding ports technologies.	
DM4600 – 72-POTS 800.0623.02	Supports 72 ports with telephone functionalities through 3 front panel connectors. It uses SIP signaling with IMS Core and provides common functionalities of the switched telephone network. Provides 72 x POTS ports, compatible with SIP signaling and G.711 codecs (A-law and U-law), G.729 A/B, G.722.1/2, G.723.1, G.726 and Clear Mode.	
DM4600 – 1-STM1 800.0873.03	Allows migration from deterministic data service networks to new generation networks. It also allows the migration from legacy services to IPSAN, providing soft transition among existing and new services. Supports timeslots cross-connection with CAS grooming. Clock regeneration is supported. Front panel with 1x155 Mbit/s STM1 port line card.	

DM4600 FAMILY MODULES (CONTINUATION)

MODULE		DESCRIPTION	
DM4600 – ICAD-705 800.0829.04		ICAD adaptor module, which allows migration of tributary HW of DM705 multiplexer to IPSAN. It is possible then to do a soft transition among new and existing services, reusing parts of DM705 HW at IPSAN and preserving already-made investments of DM705. It allows installation of 2 x DM705 interface boards. Supports EI (75/120 ohms), G.SHDSL TDM and V.35 interfaces.	
DM468x – GPC-8S 800.0984.01		General Purpose Card with alarms, management and 2048kHz clock sync (in/out) interfaces. Includes 4x1GE SFP with redundancy protection.	
DM468x – PWR8 800.0678.01		DC Power Supply module for use into DM4680 chassis. Full range (-36 to -72VDC). Hot swappable. Redundant operation capable.	
DM465x – PWR5-F 800.5091.01		DC Power Supply and Fan Control module for use into DM4650-HS chassis. Full range (-36 to -72VDC). Hot swappable. Redundant inputs.	
DM468x – FAN 800.0985.02		The Fan module is composed of a mechanical structure that houses six fans.	
DM4650 – FAN 800.0778.03		Fan module for DM4650.	

TECHNICAL SPECIFICATIONS

PORT DENSITY

The following table shows the maximum number of ports on each DM4600 chassis considering installing or not installing the redundant controller card (MPU).

		SHDSL	ADSL	VDSL	GPON	POTS	1GE	10GE	V.35	EI	SHDSL (TDM)	STM1
DM4650-HS	Single MPU	288	432	432	48	432	8	4	72	192	96	6
	Redundant MPU	240	360	360	40	360	8	4	60	160	80	5
DM4680	Single MPU	672	1008	1008	112	1008	8	4	168	448	224	14
	Redundant MPU	624	936	936	104	946	8	4	156	416	208	13

TECHNICAL SPECIFICATIONS (CONTINUATION)

POWER CHARACTERISTICS

POWER SUPPLY

	DM46050-HS	DM4680
Operational Voltage Range	-36V to -72V	-36V to -72V
Power Supply Type	DC	DC
Power Supply Input Plug	3W3	5W5

POWER CONSUMPTION

To estimate the total power consumption of the equipment must be added the consumption of each module used.

Hardware Module	Consumption (W)
DM4600 – MPU10	50
DM4600 – MPU20	70
DM4600 – I-STM1	35
DM4600 – 8-GPON	80
DM4600 – 48-SHDSL	75
DM4600 – 72-ADSL	80
DM4600 – 72-VDSL	98
DM4600 – 72-POTS	55
DM4600 – ICAD-705	20
DM4650 - FAN	36
DM468x - FAN	300
DM468x – GPC-8S	20

MEAN TIME BETWEEN FAILURES

Hardware Module	MTBF (years)
DM4650-HS Sub-rack	55.1
DM4680 Sub-rack	51.6
DM4600 – MPU10	25.7
DM4600 – MPU20	25.2
DM4600 – I-STM1	26.5
DM4600 – 8-GPON	25.5
DM4600 – 48-SHDSL	23.1
DM4600 – 72-ADSL	20.4
DM4600 – 72-VDSL	20.7
DM4600 – 72-POTS	20.5
DM4600 – ICAD-705	23.6
DM4650 - FAN	10.6
DM468x - FAN	10.3
DM468x – GPC-8S	29.5
DM468x – PWR8	33.3
DM465x – PWR5-F	23.5

MAXIMUM THROUGHPUT

Capacity	DM4650-HS	DM4680
Backplane	65Gbits/s	395Gbits/s
Per card slot	2,5Gbits/s	10Gbits/s

SCALABILITY

	Capacity
Maximum MAC Addresses	32k (MPU10) 128k (MPU20)
Maximum Static Routes	1000
Simultaneous configured VLAN	4094

ENVIRONMENT DATA

OPERATING CONDITIONS

	DM4650-HS	DM4680
Temperature Range	-5°C to 55°C	-5°C to 55°C
Relative Humidity	10% to 95%, non-condensing	10% to 95%, non-condensing
Altitude	0m to 3000m	0m to 3000m

STORAGE AND TRANSPORTATION CONDITIONS

	DM4650-HS	DM4680
Temperature Range	-40°C to 70°C for non-climatized transportation (packaged)	-40°C to 70°C for non-climatized transportation (packaged)
	-10°C to 70°C for other cases	-10°C to 70°C for other cases
Relative Humidity	10% to 95%, non-condensing	10% to 95%, non-condensing

PHYSICAL DIMENSIONS

Dimension (mm)	DM4650-HS	DM4680
Height	220,2 (5U)	486 (11U)
Width	445,5 482,6 (with mounting brackets)	444 482,6 (with mounting brackets)
Depth	261 299 (with long mounting brackets)	268

WEIGHT

Hardware Module	Weight (kg)
DM4650-HS Sub-rack	5.89
DM4680 Sub-rack	11.95
DM4600 – MPU10	1.02
DM4600 – MPU20	1.02
DM4600 – I-STM1	1.05
DM4600 – 8-GPON	1.02
DM4600 – 48-SHDSL	1.58
DM4600 – 72-ADSL	1.20
DM4600 – 72-VDSL	1.27
DM4600 – 72-POTS	1.30
DM4650 – FAN	1.22
DM468x - FAN	3.97
DM468x – GPC-8S	0.51
DM468x – PWR8	0.18
DM465x – PWR5-F	0.20

SOFTWARE

	Version
Operational System	11.00.02
DmView	9.1



DATA COM

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