

24-Port Standalone VDSL2 Switches

6-band DMT-Based Ethernet Over VDSL

- High VDSL2 Speeds/Extended Cable Distance
 - Asymmetric/Symmetric 6-band Operation
- Adaptive Rate/Fixed Rate Support
- **Built-in Splitter Per VDSL Port**
 - Combo 1000BASE-T/SFP Gigabit Uplinks to Carriers' Backbones
- -Advanced Switch/Management Functions

The DAS-3626 are 6-band high-speed VDSL2 switches that leverage the extraordinary bandwidth of VDSL2 technology, the next step in the delivery of new high -speed Internet applications to home and office users. Designed for deployment in apartment buildings, hospitals, factories and offices, these CO (central office) devices provide VDSL access to the CPE (consumer premise equipment) such as the Bridge Remote Units (modems) from the subscribers. These switches connect to the service provider's public optical network (PON) through their Gigabit Ethernet fiber interfaces. They provide the last mile connection by extending the public high-bandwidth network to people living and working in multi-unit, multi-tenant buildings, and are ideal for carriers offering concurrent high -speed Internet access, multimedia services and packet telephony services.

High-speed Internet Access. The DAS-3626 switches offer the 6-band VDSL technology for telecom carriers to address the increasing service demands, delivering up much higher broadband speeds over a single copper pair. They support both symmetric and asymmetric applications and cover various deployment scenarios in home and enterprise networks.

24 VDSL Ports & 2 Gigabit Uplinks. The DAS-3626 switches provide 24 Ethernet over VDSL (EoVDSL) ports respectively. All three switches provide 2 combo 1000BASE-T Gigabit ports/SFP slots for uplinks to the carrier's optical network.

Automatic Connection and Continuous Telephone Service. Connection to the VDSL modems at the CPE side is automatic when you turn on the power of the DAS-3626 switches. Using the original setting, there is no need for you to re-configure the system. The DAS-3626 switches are equipped with built-in splitter per VDSL port, dispensing system integrators of the need to install separate voice splitters for the phone lines. This facilitates carriers' offering of simultaneous data/voice services (including telephone, fax and ISDN) on the same line for end-users. Uninterrupted telephone service is guaranteed even when the switch's power is turned off, or in an event of a power outage or a hardware failure.

Complete FTTH/FTTB Solution. The DAS-3626 VDSL2 switches are part of D-Link's total solution for Fiber to the Home/Fiber to the Building that takes advantage of the VDSL-over-Ethernet technology. This solution includes VDSL modems, multi -port VDSL routers and multi-port VDSL switches.



FEATURES

Cost Saving Solution for Service

- Providers
- 24 VDSL2 Ports
 24 Built-in Splitter Ports
 2 Combo 1000BASE-T/SFP
- Gigabit Uplinks

Elexible/Secure

- Configuration/Management
- Local RS-232 Out-of-Band CLI
 Remote In-Band SNMP/Telnet
- Management
- Multi-Level User Privilege System
- Management SNMP v1, v2c, v3 Support
- Firmware Upgrade

Advanced Functions for

- **Broadband Service Offering**
- IGMP Snooping Groups, IGMP Proxy/IGMP Fast Leave
- Multicast
- Port-Based/Tag-Based VLANs
- Traffic Segmentation to Isolate Communication Between
- VDSI Ports
- MAC/IP-Based Access Control List
- Spanning Tree for Redundant Backup Bridge Paths QoS: 802.1p Traffic Prioritization
- Link Aggregation to Carrier's
- Backbone Broadcast Storm Control

Technical Specifications

Device Interfaces

DAS-3626 :

- 24 VDSL ports (1 RJ-21 connectors)
- 24 VDSL to PSTN splitters (1 RJ-21 connectors) - 2 combo 10/100/1000BASE -T ports/SFP slots
- 1 RJ-45 10/100BASE-TX management port
- 1 RJ-45 Alarm port
- 1 RS-232 console port

VDSL ■Standards

- ITU-T Rec G 993 2 Annex A and Annex K
- ITU-T Rec.G.993.2 Band plan
- ITU-T Rec.G.997.1
- ITU-T Rec.G.994.1

Band Plan

For frequency bands from 12 MHz to 30 Mhz, partitioning of frequency spectrum is downstream band (DS3) from 12 to 23 Mhz and upstream band (US3) from 23 to 30 MHz. Usage of US0 band complies with VDSL2 Profiles of ITU-T Rec. G.993.2

VDSL Duplex Method

Frequency Division Duplexing, FDD

VDSL 6-band Operation

ITU-T G.993.2, including DS1, US1, DS2, US2, DS3, band from 25kHz to 30MHz

■VDSL Line-Code Scheme

- Multi-carrier modulation (discrete Multi-tone, DMT) - Sub-carrier spacing complies with ITU-T Rec. G.993.2 - Delta between frequency of -carrier granularity 4.3125 kHz +_ 5 0 p pm

Rate Adaptive (RA) / Fixed Rate

 Capability for rate adaptation modes complies with ITU-T Rec. G.993.2 and G.997.1
 Rate adaptation modes: manually configurable or RATE ADAPTIVE AT INIT mode
 Rate adaptation mode configurable on per line basis for VDSL2 line

■VDSL Requirements Compliant with ITU-T G.993.1, G.993.1 Annex A, G.993.2 Annex A

VDSL Ports

GINE CONTRACTION CONVERGENCE (PTM-TC) function defined in ITU-T Rec. G.993.2 Annex K

Built-in Low Pass Filter/Splitter

- DC Resistance from Tip or Ring to Ground: = > 5 Mo hms
- Insertion Loss caused by Loading LPF: < 1.0 dB
- < 1.0 dB
- Attenuation Distortion: complies with ITU -T G.992.3 Annex E.2.3.1.3
- Return Loss: complies with ITU -T G.992.3 Annex E.2.3.1.5

Upstream Power Back off (UPBO)

Enable/Disable UPBO function compliant with ITU-T VDSL2

Latency

- Back-to-back Fast Channel Mode latency: < 3 ms.
- Interleave Mode latency: < 10ms

- Latency path complies with ITU-T Rec. G.993.2 - Payload transfer delay of latency path: manually configurable

Transmission Power

14.5dB and support Transmission Power value report by VDSL Line

VDSL2 Profiles

- 8b,8d, 12a, 12b, 17a and 30a profiles as specified in ITU-T Rec. G.993.2

- DS1 frequency band of 30a profile starts at

138kHz - Edge frequency of upper band of 30a profile: 30 MHz

- Profiles programmable by command and automatically adapted according to line

condition on per VDSL2 line basis - Numbers of VDSL2 line profiles: 60

Spectral Mask

- Transmitter signal compliant with Power Spectrum Density (PSD) mask in ITU -T Rec.G.993.2

- Downstream spectral mask #1, D-32 mask support

 Maximum aggregation power of downstream signal transmitted by transceiver < or = maximum aggregation downstream transmit power specified in specific VDSL2 profile as Defined in ITU-T Rec. G.993.2

OAM Communication Channels

Transmitter support interactive management functions between VTU-O and VTU-R using embedded operations channel (EOC) and indicator bits channel (IB) as defined in ITU-T Rec. G.993.2

Trellis Coding

Trellis coding specified in ITU-T Rec. G.993.2

INP Capability

 Impulse noise protection (INP) compliant with ITU-T Rec. G.993.2
 Minimum impulse noise protection (INP_MIN):

configurable - Minimum 2 DMT symbols protection, INP MIN

Of 2

Loop Diagnostics

-Support loop diagnostic standard in ITU-T G.993.2. -The test parameters are including Channel Characteristics per subcarrier in a logarithmic scale, Quiet Line Noise per subcarrier, Signal-to-Noise Ratio per subcarrier, Loop Attenuation per band, Signal Attenuation per band, Signal-to-Noise Ratio Margin per band, Attainable Net Data Rate, and far-end Actual Aggregate transmit power. -Provide loop diagnostic functions for VDSL2 lines and can be done on demand on per VDSL2 line basis and to report the test results by the CIT of the DAS-3626. To do this function for any - After completing the loop diagnostic function, the DAS-3626 support auto-return to the normal state ready for initialization and the test results can be

observed. VDSL2 line doesn't effect or interrupt any other working VDSL2 line traffic during and after the loop diagnostic procedure.

DPBO

Support downstream power back-off (DPBO) to efficiently shape the VDSL2 downstream signal spectrum to mitigate far-end crosstalk (FEXT) caused by downstream transmissions on shorter loops to longer loops in the same binder. The shaping mechanism complies ITU-T G.997.1 and can be enabled or disabled.

VDSL Performance

- VDSL line supports transport of net data at integer multiples of 32 Kbit/s from 32 Kbit/s to MaxDS downstream and from 32 Kbit/s to MaxUS upstream

- MaxDS and MaxUS support 100 Mbit/s and 100 Mbit/s, respectively

 Downstream and upstream net data rates programmable by command and automatically adapted according to line condition on a per VDSL line basis

Handshake Protocol

Complies with ITU-T Rec. G.994.1

FEC

- Forward Error Correction, FEC support - Support FEC value report by VDSL Line

Loss of Signal (LOS)

Maintenance signal alarms including Loss of Signal (LOS), Loss of Frame (LOF) and Link < 1.0 dB Up/Down generated and detected for each VDSL2 line

SNR Margin/SNR Margin per Band

-Support the function to observe the actual net data rate, the line attenuation/line attenuation per band, SNR margin/SNR margin per band, actual interleaving delay, actual impulse noise protection, the attainable net data rate, channel characteristics per subcarrier and quiet line noise PSD per subcarrier of each VDSL2 line. -Support target noise margin, max. noise margin, min. noise margin, max. interleaving delay, min. net

data rate, max. net data rate and INP min for VDSL2 line interfaces and can be configurable. -Support SNR margin status report by VDSL Line



L2 Switch Function

FE/GE Ports

- Full-wire speed (full-duplex) operation on all FE/GE ports

- Forwarding rate for 10BASE -T up to 14,880 packets per second - Forwarding rate for 100BASE -TX up to 148.800
- Forwarding rate for 100BASE-12 packets per second
- Forwarding rate for 1000BASE -T up to
- 1,488,000 packets per second
- Transmission range up to 100 meters over Cat-5e/Cat-6 UTP cables
- Connector type: RJ-45

■SFP/1000BASE-LX5 Module - IEEE 802.3z standard - Supports full-duplex, wire-speed packet forwarding with forwarding rate up to 1,488,000 packets per second over 5-Km-long ITU-T G.652 single-mode fibers.

SFP/1000BASE-LX15

- IEEE 802.3z standard

- Supports full-duplex, wire-speed packet forwarding with forwarding rate up to 1,488,000 packets per second over 15 -Kmlong ITU-T G.652 single-mode fibers.

SFP/1000BASE-LHX

 IEEE 802.3z standard
 Supports full-duplex, wire-speed packet forwarding with forwarding rate up to 1,488,000 packets per second over 40-Kmlong ITU-T G.652 single-mode fibers.

Software Functions

L2 Features

IGMP snooping V1/v2

-Support 2 modes for no joined multicast traffic: default flooding and default filtering -Turning on/off IGMP snooping function does not affect the normal operation of dedicated multicast VLANs.

IGMP

-Support IGMP version 2 standard in RFC2236 -Support 256 multicast groups which can be statically allocated and also work well simultaneously. -Provide IGMP statistics, including:

Provide IGMP statistics, including:
 Per VDSL2 port, per dedicated multicast VLAN counters: support IGMP join, IGMP leave, and current number of active multicast groups.
 Per multicast group counters: support current number of active join ports.

IGMP Proxy

- Support IGMP Proxy function

- Comply with IETF RFC-4541 or later versions

■IGMP Immediate Leave

- Support to turn on/off IGMP Immediate Leave. - When IGMP Immediate Leave is turned on, the DAS-3626 support stop sending the multicast stream immediately when receiving an IGMP leave for the last member on this requesting interface without sending one or more group specific queries and waiting for its timeout.

 When two or more multicast clients are served concurrently through. a single subscriber interface, turning on IGMP Immediate Leave function. shall not affect channel switching and multicast video playing for each client. Forwarding Mode Store and Forward

Switching Capacity DAS-3626 12.8Gbps

■64 Byte System Packet Forwarding Rate 9.5 million packets per second

Priority Queues8 Priority Queues per port

MAC Address Table 16K MAC addresses

Rate Control Supports rate control of Broadcast, Multicast and unknown Unicast packets

Trunk Groups Supports 1 group (gigabit ports only)

Loopback Test Support loopback test capability.

Limit Maximum Learned MAC Addresses Support the function to limit the maximum number of dynamically learned MAC addresses based on per VDSL2 line or per VLAN and allow only packets with dynamically learned MAC addresses to pass through a port in the DAS-3626. The range of limitation for each VDSL2 line can be configurable from 1 to 512 with step of 1.

BPDU Control

Discards BPDU packets per subscriber interface.

Reset

-Support VDSL2 line units reset by CIT. -Support factory default configuration, and loaded with default configuration when necessary.

IGMP Filtering

-Support number of IGMP filtering 60 profiles -Support multicast address range in each IGMP filtering profile 128 entries and can be configurable. -Each VDSL2 port can be assigned with an IGMP filtering profile, and can be configurable.

-Support the function to limit the number of IGMP messages on per VDSL2 interface per second, and support to configure value.

-Support to limit the maximum number of concurrent multicast groups per VDSL2 port. The maximum number can be configurable from 1 to 256 with step of 1.

Multicast VLAN

-Support 5 dedicated multicast VLANs, and can be configurable.

-Within a dedicated multicast VLAN, specific multicast traffic can be directed to multiple multicast clients from different VDSL2 lines that have joined the specific multicast groups, while each VDSL2 line still belongs to:

a port-based VLAN

IEEE 802.1Q VLAN,

-Support every VDSL2 line join up to 5 dedicated multicast VLANs.

-The multicast group address range can be configurable for each dedicated multicast VLAN. The number of multicast group address ranges for each dedicated multicast is up to 16 VLANs, -Support to configure multicast IP address for multicast service.

-Support 24 copies for DAS-3626 with 24 VDSL2 ports for each multicast group and work well, respectively.

■802.1w Rapid Spanning Tree - 802.1w RSTP compliance 802.1D spanning tree

- 802.1D STP compliance
- Support transparent bridging protocol specified in IEEE 802.1D standard.

802.1s Multiple STP

- 802.1s RSTP compliance
- Spanning tree per VLAN

WRED congestion control Weighted Random Early Detection

Port mirroring

Support one-to-one or many-to-one port Mirroring

STP loopback prevention

VLAN ■802.1Q VLAN

VLAN Group

-Support to configure VID from 1 -4094; total VLAN 4K

-Support 4K static VLAN groups

802.1Q Service VLAN (S-VLAN)

-Can be turned on or off in each VDSL2 ports. When the function is enabled, the Ethernet type and IEEE 802.1p values of the S-VLAN can be modified. -Support S-VLAN tagging capability at the VDSL2 port.

Port Base VLAN

Support configurable port-based VLAN.



Software Functions

Protocol-based VLAN -Support packet classification according to the Ethernet type by per port -Support tagged with VLAN ID and IEEE 802.1p

value, and can be assigned to priority queues Support 8 classification entries per port and can be configurable.

Quality Of Service

■802.1p support

- Comply with IEEE 802.1p standard - The scheduling mechanism support provide Strict Priority (SP), WRR (weight round robin), and WFQ (weight fair queue) mode, and can be configurable.

Number of Queues per Port The number of classification entries support 8 entries in each port.

CoS Based on Switch Port

CoS Based on MAC Destination and Source Address

CoS Based on TOS

CoS Based on IP Destination and Source address

CoS DSCP

- Support Ipv4 only - Specified in RFC 2475, and classify packets into different IEEE 802.1p queues according to DSCP values

CoS Based on TCP/UDP port

ACL (Access Control List) Support 2000 rules & 9 masks per device

Based on Switch Port

Based on Ethernet type

Based on MAC address Destination MAC address, source MAC address

Based on 802.1p priorit IEEE 802.1p value.

Based on VLAN

Based on DSCP

Based on IP address Destination IP address, source IP address

Based on protocol type

Based on TCP/UDP port TCP/UDP port number

Based on TCP/UDP payload [packet content]

Apply one ACL rule to more than one-port in CLI Interface

Security

RADIUS authentication for Management Access Support administrator authentication and authorization with a RADIUS/TACACS server via The RADIUS/TACACS protocol

TACACS+ authentication for Management Access

Support administrator authentication and authorization with a RADIUS/TACACS server via The RADIUS/TACACS protocol

SSH v2

SSI v3

Broadcast Storm Control -Allow specifying the threshold in terms of pkt/s for per block Over threshold, just discard packet. Min granularity: 1 pkt/s -Support to limit the number of broadcast and unknown unicast packets entering the DAS-3626 to prevent the broadcasting storm. The range of limitation for each port can be configurable from 1,000 bps to the maximum port rate with granularity no greater than 1,000 bps.

Bandwidth Control

Per port granularity 64Kb/s

Traffic Segmentation

Management level

Support administrator authentication and authorization for all the administration control connections. The authorization can support two management levels of read-write and read-only. The read-write management level allows the administrator to read, create, modify and delete data, and the read-only management level can allow the administrator to read but not create, modify and delete data.

CPU Protection

Protect CPU from Broadcast/Multicast/Unicast flooding=> ARP storm (metering), HW default route enable

Management Single IP Management Support SIM v1.5

Web-based GUI

CLI

Web MAC address Browsing

Telnet Server

Support at least 5 telnet sessions working well simultaneously and provide the auto-logout Mechanism for the telnet sessions.

TFTP client

Support remote software upgrade via TFTP

SNTP

Support RFC 2030 SNTP

SNMP v1

-Support SNMP agent and configure SNMP read/write communities. If the SNMP agent function is disabled, the UDP port number of SNMP agent function will be closed. -The management activities can be performed by SNMP operations.

SNMP v2c

-Support SNMP agent and configure SNMP read/write communities. If the SNMP agent function is disabled, the UDP port number of SNMP agent function will be closed.

-Support SNMP traps and these traps can be reported to NMS.

The management activities can be performed by SNMP operations

SNMP v3

RMON v1

Support 4 groups (Statistics, History, Alarms, Events)

BootP/DHCP client

■DHCP load system configuration file

SYSLOG

Support RFC 3164 remote syslog using TFTP uploads to keep track of system events. The events categorized into 3 levels according the severity of the event to the customer services. The DAS-3626 support filter the messages sent to the server according the levels.

Trap/ Alarm/ Log Severity Control

-Allow to divide the severity of logs into 3 levels, and configuration to trigger logging only for certain level of loas

-Support trap mechanism and include trap of cold start, warm start, link down, and link up. -Support fan and power alarm trap.

Dual Image

Support remote firmware upgrade function from the NMS, and provide at least two complete boot Images and one configuration file.

CPU Monitoring

- Allow monitoring the utilization of CPU via Web/ CLI/ SNMP

 Allow to set the threshold and when CPU utilization hit the threshold, device will send out trap & log.

Show Config Command

Software Functions

DAS-3626



DHCP relay + option 82

Support DHCP Relay Agent Option 82 function standard in IETF RFC3046.

"Agent Circuit ID" sub-option: can be encoded the VDSL2 line identification in the "Agent Circuit ID" sub-option (sub-option 1). The encoding can uniquely identify the DAS-3626 and the VDSL2 line on the DAS-3626 on which the DHCP discovery message was received.

message was received. - "Agent Remote ID" sub-option: Provide the option to use the "Agent Remote ID" sub-option (sub-option 2) to further refine the VDSL2 line identification. The Agent Remote ID contains an operator-configured string that uniquely identifies the subscriber on the associated VDSL2 line on the DAS-3626 on which the DHCP discovery message was received.

-Can be enabled/disabled , and the value within Circuit ID and Remote ID sub-options can be configurable.

Web UI supports non-IE browser

Display the Tx/Rx traffic, Display source MAC addresses

-Per VLAN basis for each network interface, -Per interface or per VLAN basis for each VDSL2 VDSL2 line,

Performance Monitoring

-DAS-3626 support performance monitoring and performance data collection functions. -Provide performance parameters for VDSL2 line are including far-end and near-end Errored Second

(ES), Severely Errored Second (SES) and Unavailable Second (UAS).

-Provide performance parameters for VDSL2 line are including the near-end Code Violation (incorrect Cyclic Redundancy Check, CRC).

-Provide performance parameters for combo GbE interface are including error packets, discarded packets, unicast packets, and multicast packets. -Provide performance parameters are including CPU utilization ratio, packet buffer usage ratio, and memory usage ratio.

-Each event counts for each performance parameter, support stored in the Network -Current counters for 15-minute and 1-day, previous counters for 15-minute and 1-day, and a certain number of recent 15-minute counters can be provided for each performance parameter of VDSL2 line interface. -The data of Performance parameter can be readable on demand via CIT and NMS. -Provide enough memory buffers to store event counts for each performance parameter at least 7 days and comply with RFC3728.

-DAS-3626 can recognize a threshold crossing for a given performance parameter including far-end and near-end Errored Second (ES), Severely Errored Second (SES), Unavailable Second (UAS), far-end and near-end Code Violation (incorrect Cyclic Redundancy Check, CRC) of VDSL2 line and CPU utilization ratio, packet buffer usage ratio, memory usage ratio, a threshold report can be generated and sent to the NMS. The threshold value can be configurable.

-Support ICMP function and can respond to the ICMP request message sent from NMS or other system.

Configuration

-After system power restart at DAS-3626 due to the input power or equipment failure, the updated records of the configuration parameters can be automatically reloaded to DAS-3626. -DAS-3626 support remote configuration functions to configure password, Ethernet interface, 802.1p function, IGMP snooping

-DAS-3626 support remote enable/disable functions to control IEEE 802.11g wireless AP interface, PPPoE function, Network Address Translation (NAT) function

MIB

RFC 1493 Bridge MIB

RFC 1213 MIBII

■RFC 1643 Ethernet MIB

■RFC 1907 SNMPv2 MIB

RFC 2819 Four groups of RMON

RFC 1757 RMON MIB RFC2358

RFC 2674 802.1p MIB

Q-BRIDGE-MIB and P-BRIDGE-MIB

RFC 2233 MIB

RFC 2618 RADIUS Authentication Client MIB

■RFC 2620 RADIUS Accounting Client MIB

RFC 2863 IF-MIB

RFC 3728 VDSL-MIB

-Downstream/upstream maximum net data rate and minimum net data rate configurations read and write.

-Downstream/upstream target noise margin, maximum noise margin, minimum noise margin, INP_MIN, maximum interleaving delay and SNR margin configurations read and write, -Downstream/upstream SNR per carrier, SNR margin per band, actual net data rate, VDSL2 transmit and receive power, Attenuation per band, actual interleaving delay, actual impulse noise protection, the attainable net data rate, channel characteristics per subcarrier and quiet line noise PSD per subcarrier of each VDSL2 line configurations read,

-VDSL2 PM support include ES, SES, UAS, LOF, LOS and LOL

Proprietary MIBs

-ICMP Ping test, Packet Loss Rate and Round Trip Time inquiry. The number of ping times can be configurable. -Running configuration writes and backup

-TFTP/FTP uploads and down loads -VDSL2 loopback test

-Configurations write of the maximum number of MAC addresses per VDSL2 line, and read of learned MAC addresses

-Number of broadcast/multicast/unknown unicast packets

-IGMP snooping/immediate leave/filtering status read and configurations write

-Dedicated multicast VLAN configurations read and write

-Combo GbE port status read

- ACL function configurations write

-Protocol-based VLAN configurations write -S-VLAN function configurations write

- Traffic shaping or rate-limiting function

configurations write

 Port Mirroring function configurations write
 Community Table (including read community, write community) and TrapTable (including receiver IP, trap community) configurations read and write,
 Firmware version read
 Similar to IEEE 802.11 MIB.

-Provide SNMP mibs of all functions for device network management

D-Link Private MIB

Physical & Environmental for DEV-3718K/DEV-3726K

Power Input

- AC Input: 100 ~240 VAC, 60± 3 Hz Hz Internal universal power supply -DC Input: DC – 42 V ~ –56 V

Power consumption

Power consumption of the VDSL2 interface is under 2 W per port.

Operating Temperature
 -0 ~ 65 C

■Storage Temperature - -40 ~ 70 C

Humidity 10 ~ 90% non-condensing Acoustic Under 45Db

■MTBF DAS-3626 4 years

Dimensions 490mm (W) X 290mm (D) X 66mm (H) 19-inch 1.5U Rack-mount size



EMC & Safety

EMI-EMC Compliance

Comply with Class A of Subpart B of Part 15 of the FCC (Federal Communications Commission) r ules of U.S.A..

Safety Compliance Design to meet CSA International

Surge protection

Design to meet ANSI/TIA-968-A the AC power supply lines of the DAS-3626 allows to safeguard the units against the damage due to transient and lightning surge voltage presented on the telephone line and AC power supply line. The test results can be temporary degradation or loss of function or performance but support self-recoverable and pass operationally within 10 minutes.

