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Technical Specification

Access Terminals, Transmission and Multiplexing (ATTM); Common Requirements for Automated Distribution Frames (ADF) at Street Cabinet



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650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Access, Terminals, Transmission and Multiplexing (ATTM).

1 Scope

Due to the requirements for the spreading of xDSL based broadband services, in particular combining more confined coverage areas, faster speeds and multiple services support, operators have primary interest in solutions for automated distribution frames in street cabinets and operators' room down to the building.

The present document gathers a first set of common requirements for ADF (Automated Distribution Frames) systems in configurations for street cabinets.

The aim of the present document is also to have an integrated view of the architecture, configurations and related management systems required to maintain the overall systems at street cabinets, as today's evolution scenarios predict the possibility of having automated distribution frames spread across networks.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

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2.1 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- [1] ETSI EN 300 386: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Telecommunication network equipment; ElectroMagnetic Compatibility (EMC) requirements".
- [2] ETSI ES 201 468: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Additional ElectroMagnetic Compatibility (EMC) requirements and resistibility requirements for telecommunications equipment for enhanced availability of service in specific applications".
- [3] ETSI TS 101 270-1 (V1.3.1, clauses 8.1.1 and 9.2): "Transmission and Multiplexing (TM); Access transmission systems on metallic access cables; Very high speed Digital Subscriber Line (VDSL); Part 1: Functional requirements".
- [4] ETSI ES 201 468: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Additional ElectroMagnetic Compatibility (EMC) requirements and resistibility requirements for telecommunications equipment for enhanced availability of service in specific applications".

- [5] ETSI EN 300 132-2: "Environmental Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 2: Operated by direct current (dc)".
- [6] ETSI EN 300 119-5: "Environmental Engineering (EE); European telecommunication standard for equipment practice; Part 5: Thermal management".
- [7] ETSI EN 300 019-2-3: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-3: Specification of environmental tests; Stationary use at weatherprotected locations".
- [8] ETSI EN 300 119: "Environmental Engineering (EE); European telecommunication standard for equipment practice; Part 1: Introduction and terminology".
- [9] ETSI EN 300 253: "Environmental Engineering (EE); Earthing and bonding of telecommunication equipment in telecommunication centres".
- [10] ETSI EN 300 386: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Telecommunication network equipment; ElectroMagnetic Compatibility (EMC) requirements".
- [11] IEC EN 60439-5: " Low-voltage switchgear and controlgear assemblies - Part 5: Particular requirements for assemblies for power distribution in public networks".
- [12] IEC EN 60068-2-11: "Basic Environmental Testing Procedures - Part 2: Tests".
- [13] IEC EN 60062: "Marking codes for resistors and capacitors".
- [14] Directive 73/23/EEC Council Directive of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits and Council Directive 93/68/EEC of 22 July 1993 amending Directives 87/404/EEC (simple pressure vessels), 88/378/EEC (safety of toys), 89/106/EEC (construction products), 89/336/EEC (electromagnetic compatibility), 89/392/EEC (machinery), 89/686/EEC (personal protective equipment), 90/384/EEC (non-automatic weighing instruments), 90/385/EEC (active implantable medicinal devices), 90/396/EEC (appliances burning gaseous fuels), 91/263/EEC (telecommunications terminal equipment), 92/42/EEC (new hot-water boilers fired with liquid or gaseous fuels) and 73/23/EEC (electrical equipment designed for use within certain voltage limits)".
- [15] ITU-T Recommendation K.20: "Resistibility of telecommunication equipment installed in a telecommunications centre to overvoltages and overcurrents".
- [16] ITU-T Recommendation K.44: "Resistibility tests for telecommunication equipment exposed to overvoltages and overcurrents - Basic Recommendation".
- [17] ITU-T Recommendation K.45: "Resistibility of telecommunication equipment installed in the access and trunk networks to overvoltages and overcurrents".
- [18] IEC EN 60950: "Information technology equipment - Safety".

3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ACK	ACKnowledge
ADF	Automatic Distribution Frame
ADSL	Asymmetric Digital Subscriber Line
API	Application Programming Interface
BSS	Business Support System
CLI	Command Line Interface
CLR	CLear
CORBA	Common Object Request Broker Architecture
CPU	Central Processing Unit
DB	DataBase
DC	Direct Current

DSLAM	Digital Subscriber Line Access Multiplexer
EMS	Element Manager System
FCAPS	Fault, Configuration, Accounting, Performance and Security
FTP	File Transfer Protocol
FTTB	Fiber To The Building
FTTCab	Fiber To The Cabinet
GUI	Graphical User Interface
HW	HardWare
IDC	Insulation Displacement Connector
ISDN	Integrated Services Digital Network
M	Mandatory
MEMS	Micro Electro-Mechanical Systems
MIB	Management Information dataBase
MS	Management System
NE	Network Element
NMS	Network Management System
OAM	Operations, Administration and Maintenance
OC	Object Code (object under transaction for the MS)
ONU	Optical Network Unit
OS	Operating System
OSS	Operational Support Systems
P	Preferential
PCM	Pulse-Code Modulation
POTS	Plain Old Telephone Service
PTC	positive temperature coefficient (resistor)
RMI	Remote Method Invocation
RPC	Remote Procedure Call
SNMP	Simple Network Management Protocol
SSH	Secure Shell Protocol
SW	SoftWare
TFTP	Trivial File Transfer Protocol
TL1	Transaction Language 1
TLC	TeLeCommunication
VDSL	Very-high-Data-rate digital Subscriber Line
XML	eXtensible Markup Language

4 General description of ADF

ADF replaces or supports/complements the manual distribution frame to interconnect each subscriber line with the specific equipment to cope with the automated provision of appropriate services and multi-operator connectivity. It minimizes the need for on-site labor to physically make cross-connects and to verify service installation, reduces operational costs and maintenance and improves service delivery cycles.

In order to take advantage of all the functionality of the Automatic Distribution Frame, the following requirements need to be met:

- **NON-BLOCKING CONNECTIVITY:** the ability to switch any facility pair to any equipment pair regardless of existing connections or port utilization in the system. This requirement is set for Any-to-any ADF, while for the any-to-many solution a certain percentage of blocking is allowed.
- **SCALABILITY:** to cost-effectively scale to meet different size requirements, implementations should privilege highly modular growth capability in order to optimize the available space and port requirements.
- **CAPACITY:** the maximum number of ports in a cabinet taking into account the number of operators, subscriber lines, equipments (testing included) should typically match configurations of 600 x 600 and/or 900 x 600 lines.
- **RELIABILITY:** to guarantee an extremely high degree of confidence that connections are made correctly upon request. In addition, as the distribution frame is an essential component to provide connectivity to millions of subscribers, it must have an extremely low failure rate and long life expectancy.

- **AUTOMATIC CONNECTION VERIFICATION AND ONGOING TESTING:** the ability to remotely connect any line terminating on the frame to a testing system. This testing system, not included in the ADF solution, has to verify that connections were made correctly and are working properly. This testing system can be used to assist with service provisioning, fault isolation, and on going monitoring of the circuit.
- **INSTALLATION:** in street cabinets, the input, output and matrix stages should be able to be installed and cabled either placing the system in a slot horizontally or vertically. Installation details should be provided for these specific small cabinets/small system capacities. The connections must be made correctly upon request. Maximum interconnection cable length: 2 mt ÷ 10 mt (depending on ADF location - in the same cabinet or in a different one/manhole). Types of cables supported: twisted pair cables, broadband capable.
- **OPERATION SUPPORT SYSTEM (OSS) INTEGRATION:** must be closely integrated with service activation, inventory and workflow systems so that cross-connections can automatically take place as part of an end-to-end software-driven process flow. In addition, by tying in the distribution frame with existing fault management systems, problems can be proactively isolated and rapidly resolved with minimum human intervention. All operators can access to test functionalities.

Figure 1 presents a high-level view of the typical layers constituting BSS and OSS of an operator.

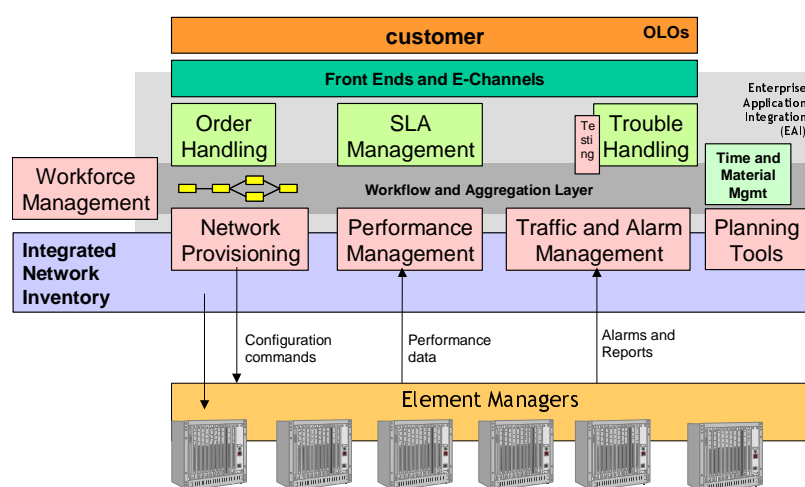


Figure 1: Typical layers constituting BSS and OSS of an operator

Three (3) high-level use cases should be distinguished where OSS will have to be able to control the ADF:

- **Provisioning:** remotely cross-connect via the ADF the selected customer's pair to the right equipment port.
- **Repair:** remotely change a customer's pair cross-connect, e.g. for connecting to another equipment port when the current port is defect.
- **Testing:** allow a remote test head or system to connect to a customer's line through the ADF (with and without interrupting the line) in order to measure the line.
- **PROVISIONING AND REPAIR:** the ADF will have to be integrated through one of the two following methods, depending on the Operator's OSS characteristics:
 - **Method 1:** by means of a network activation system. The ADF will offer an open interface (API), using a well-defined (standard) protocol, to manage the cross-connects within the ADF. The OSS (e.g. network activation system) will typically be able to send commands through that interface.
 - **Method 2:** by means of a central ADF element manager (EMS)). This element should supply the following protocol interfaces, depending on the Operator's OSS characteristics:
 - On the NorthBound Interface (OSS-EMS): SNMP, TL1, XML.
 - On the SouthBound Interface (EMS-NE): SNMP, TL1.

- **MONITORING:** when putting new equipment in the network should allow it to be monitored. Assuming that in case of a major ADF failure the cross-connects remain in pass-through, i.e. the lines are not interrupted, it should nevertheless be able to detect as soon as possible that an ADF is down. For the monitoring of network equipment it is typically integrated with the network equipment or element manager of Operator's OSS, using one of the two following methods, depending on the Operator's OSS characteristics:
 - Method 1: SNMP traps. This would require the remote ADF controller (or central ADF Element Manager if any) to dispose of a MIB and being able to send SNMP traps. Alternatives may consist of using an open interface to regularly poll the ADF controller (or central ADF Element manager) for the status of each ADF.
 - Method 2: a central ADF element manager (EMS). This element has to supply the following protocol interfaces, depending on the Operator's OSS characteristics:
 - On the NorthBound Interface (OSS-EMS): SNMP, TL1, XML.
 - On the SouthBound Interface (EMS-NE): SNMP, TL1.

The system must inform the operator that the required switching connection was established or in the opposite de-established when a path is specifically removed.

The Management System (MS) architecture should be described in terms of its main functional modules (Building Blocks). The description will trace the main OAM applications and SW versions.

Existing mechanisms to promote the MS's high reliability (fault tolerant, cluster solution, other) should be described, if any. In the description, the primary elements with redundancy shall be indicated.

Reliable safeguarding of data mechanisms (raid, disk mirroring, fault tolerant, other) should exist and be included in the description.

All of the proposed ADF equipment must be manageable by a centralized MS, with an integrated and centralized vision under all OAM perspectives (including configuration, alarm, line testing, etc.). It should be clearly stated if this centralized MS is part of the ADF system or is designed to be integrated with an external additional MS.

4.1 Main functionalities

The main functionalities of the ADF (schematically represented in figure 2) should be:

Any-to-any: any incoming pair can be connected to any pair outgoing; maximal provisioning flexibility with high number of cross-connection points, while ensuring simplification in the complexity and size of the equipment. If an any-to-any solution uses the re-arrangement functionality then this functionality should not have an influence on services of active customers.

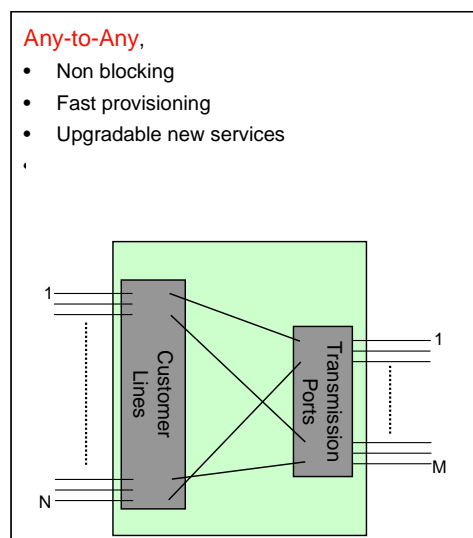


Figure 2: ADF "any-to-any" scheme

Any-to-many: only a limited number of special services can be typically connected to any output line (towards the customer). It may not substitute the manual distribution frame and allows a connection towards the output of a limited quantity of service lines.

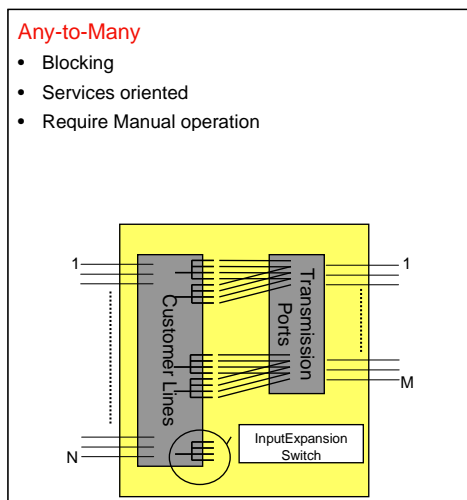


Figure 3: ADF "any-to-many" scheme

In addition to these architectures, redundant paths should be foreseen to avoid the interruption of connections in case of default on a cross-connection point.

Flexibility in the number of test ports to be provided according to operators' requirements.

The ADF adds a point of weakness in the network (compared with to the manual distribution frame): therefore, the introduction of an extra protection should be analysed. In particular:

- The ADF to contain a secondary protection and the coordination circuits (e.g. PTC).
- The overall system to be capable of accepting an additional primary protection, depending on the operator's needs.

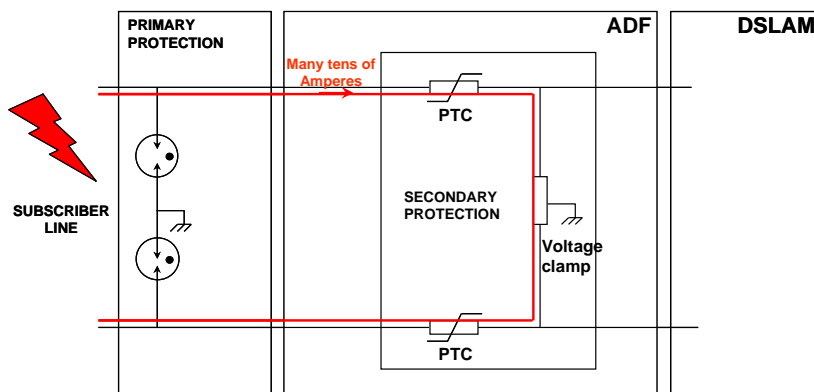


Figure 4: Example of ADF protections

The secondary protection is required for ADF if standard EN 300 386 [1] is taken into account. The secondary protection will be coordinated with the Primary, enabling its proper activation. The secondary protection is optional for ADF if standard ES 201 468 [2] is taken into account.

4.2 Available technologies

There are a number of physical layer copper cross-connect equipments available in the market today. Their designs are based on various cross-point technologies, matrix types and application needs. Cross-point technologies are the means by which the physical copper paths are connected and disconnected from one to another. Matrix types are the manner in which cross-points are grouped and interconnected within the cross-connect. The differences among technologies and design architectures make them optimized for specific applications.

The main technologies as copper cross-point are latching relays (standard and micro relays), slider x-y robots micro-switches, MEMS.

Matrix types can be crossbar matrixes, three stages or multistage matrixes, each with different properties concerning number of cross-points and functionality (intrinsically non-blocking/non-blocking with rearrangement, any to-any/to-many, etc.).

Suppliers will indicate and provide specific details concerning the technology used in their systems switching matrixes, including all the relevant elements in considering the advantages and the reasons for the selection of their solution.

4.3 Application scenarios

Distribution frames are essential to the delivery of TLC services. They provide a scalable means by which services can be delivered to individual subscribers without requiring major cabling installations or changes. In addition, by serving as a termination point for all copper pairs going to subscriber locations, they are an ideal location for test access into the last mile, allowing service providers to monitor and manage their entire physical copper infrastructure. Finally, distribution frames often serve as a demarcation point between different carriers' domains. As a result, they provide a simple means by which multiple services providers can work together in a deregulated environment while maintaining independent network infrastructures.

One of the possible application scenarios for ADF foresees the equipment connection to a DSLAM; in this case, one of the ADF functions is to facilitate the access from M customers to N DSLAM lines (typically $N \leq M$). Figure 5a shows an example of this application. The ADF will allow full connectivity between the N DSLAM lines and the M intercepted pairs. Another example (ADF any-to-any without POTS splitter) is given in figure 5b.

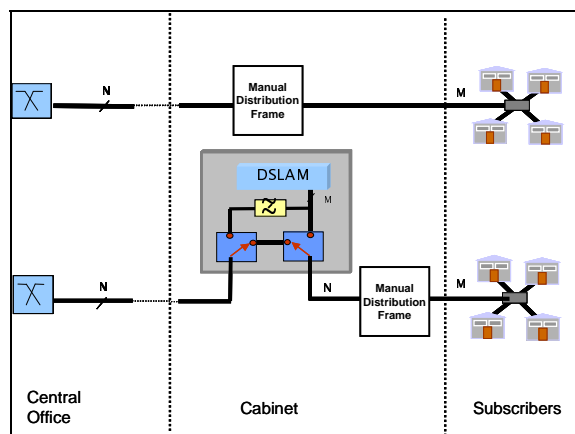


Figure 5a: Example of application scenario for the ADF

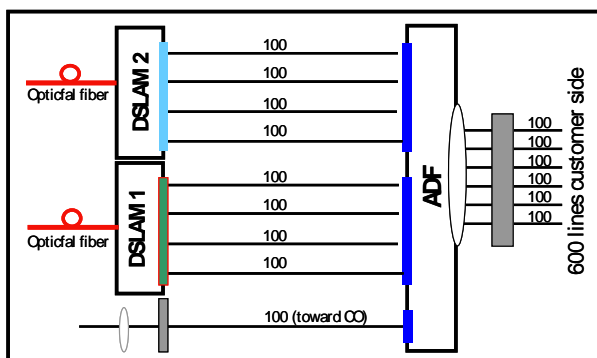


Figure 5b: Example of application scenario for the ADF

5 Requirements

By default, the ADF provides metallic continuity for all cable copper pairs. The ADF will be transparent to the signal coming from the network equipment for all the bandwidth used for the services provided in the cable.

The ADF should not reduce the performances of the following services in the access network: POTS, ISDN, Leased Lines, SHDSL, ADSL, ADSL2+, VDSL2, 2 Mbit/s (PCM).

5.1 Transmission Requirements

The following requirements apply for all combinations of the connections between any input port with any output port. All relevant parameters are measured using terminations of 100 Ω at the frequencies specified.

Table 1: Transmission requirements for ADF

Item	Performance	Comments
Bandwidth	0 MHz to 17 MHz (FTTCabinet) 0 MHz to 30 MHz (FTTB/FTTCabinet)	
Characteristic Impedance	100 \pm 15 Ω or 135 \pm 15 Ω	These values represent the typical parameters of the mostly used access network cables below 1 MHz.
Insertion loss	< 4 dB @ 30 MHz < 2 dB @ 17 MHz < 1 dB @ \leq 1MHz	1 dB @ < 10 MHz seems reachable The effect of the secondary protections (customer side) will be included in these values Values may be modified after further investigations
Return loss	> 12 dB @ 30 MHz > 15 dB @ 17 MHz > 18 dB @ 1 MHz	Still to investigate the necessity of requirements in case of low frequencies The ADF should have a good performance with different types of Access Networks cables (characteristic impedance: 100 \div 135 Ω). This should be shown with the ETSI testloops (TS 101 270-1 [3] V1.3.1 clauses 8.1.1 and 9.2 - VDSL Functional Requirements). Note: The value of 135 Ω is still allowed as a valid value, as this value has been defined in earlier of VDSL specification, and in order to prevent existing equipment with 135 Ω to become non-standard compliant.
Longitudinal Conversion Loss	\geq 40 dB @ 12 MHz to 17 MHz \geq 45 dB @ 0 MHz to 12 MHz	40 dB @ 17 MHz to 30 MHz seems reachable 50 dB @ 0 MHz to 12 MHz seems reachable
Crosstalk (NEXT)	\geq 40 dB @ 30 MHz \geq 45 dB @ 17 MHz \geq 60 dB @ 1 MHz	
Idle channel noise	TBD	Noise inserted by the system will not impair any provisioned service

5.2 Electrical requirements

5.2.1 DC Characteristics

Table 2: DC characteristics for ADF

Item	Performance	Comments
DC Resistance	< 30 Ω	The value is related to the two wires of a pair The effect of the secondary protections (customer side) will be included in these values Values may be modified after further investigations
Resistance Unbalance	< 2 Ω	The effect of the secondary protections (customer side) will be included in these values
Resistance to Earth	> 10 M Ω @ 100 Vdc	

5.2.2 Electrical protection toward overvoltages

As a minimum has to be in accordance with Recommendation ITU-T Recommendation K.20 [15]; according to the field experience, the overvoltages in this part of the network could be higher (than the values specified in ITU-T Recommendation K.20 [15]) and with a shorter rise time, so the ITU-T Recommendation K.44 [16] and Recommendation K.45 [17] for enhanced levels also will be fulfilled. The feeling is that both secondary and primary protections are needed for all subscriber lines (see introduction).

5.2.3 Electrical safety

The equipment shall comply with the safety and health conditions and regulations concerning Electrical shock, Fire and Radiations. All electronic equipment shall be in conformance with EN 60950 [18] Series last version.

The equipment shall be installed to be in accordance with local regulations and standards to ensure security of persons.

5.2.4 Electromagnetic compatibility

The equipment shall be in accordance with EN 300 253 [9], EN 300 386 [1] (emission and immunity) other than in Telecom Center if secondary protection is not included in ADF.

If secondary protection is included in ADF, the equipment will be in accordance with ES 201 468 [2] "equipment operating in locations other than in telecommunication centres" and level 2 is required.

5.2.5 Powering and consumption

The powering voltage interface will be 48 V as defined in EN 300 132-2 [5].

The following consumption requirements are to be intended as medium term objectives. In the short term higher values could be acceptable.

Table 3: Consumption requirements for ADF

ADF consumption without switching activity	< 6 W
ADF consumption with switching activity	< 20 W

5.3 Environmental requirements

5.3.1 Operating environment

For a cabinet application, the equipment in loaded configuration is compliant with the requirements of EN 300 019-2-3 [7], class T 3.3 and with the requirements of EN 300 119-5 [6]. In exceptional conditions: EN 300 019-2-3 [7], class T 3.1E the equipment can run in degraded way provided the equipment recovers a normal operational state as soon as the conditions return to those of class T3.1.

The following values represent a summary of the operating limits:

- Temperature range: -25 up to 70 °C.
- Humidity: 5 % up to 95 %.
- Rain intensity: No.
- Rate of change of temperature: 0,5°C/min.
- Condition of Condensation: Yes.
- Conditions of wind-driven rain, now, hail, etc.: No.
- Conditions of icing: Yes.

5.3.2 Protection against mechanical actions/vibration

The ADF must support the characteristics defined in EN 60439-5 [11] and EN 300 019 [19] class 3.3.

5.3.3 Protection against corrosion of metallic elements

The ADF must support the characteristics defined in EN 60068-2-11 [12], and EN 60062 [13].

5.3.4 Protection against heat and fire

The ADF must support the characteristics defined in EN 60439-5 [11].

5.4 Mechanical requirements

The "**Rack oriented**" ADF should be compliant with EN 300 119 [8] racks (e.g. 19" installation using adaptation brackets is acceptable).

Table 4: Dimensions requirements for Rack oriented ADF

Rack oriented	(mm)
Depth (Cabling included)	300
Height (900 x 600 matrix)	750
Height (600 x 600 matrix)	600

Table 5: Dimensions requirements for Block oriented ADF

Block oriented (100 ports)	(mm)
Height	175 ÷ 250
Width	150
Depth	150

Maximum mass for overall ADF: 35 kg (preferably < 25 kg), cabling excluded.

5.5 Functional Requirements

5.5.1 Switching functionalities

The ADF will have the complete connection activation, de-activation, recovery from failure, block replacement and end-to-end paths" reestablishment functionalities.

Minimum number of switching actions per normal port: 1 000.

Minimum number of switching actions per test port: 10 000 (in FTTCab scenario these ports could also be used for routine quality tests of the lines, like SELT/MELT test, so an increased amount of actions is required).

The system could perform many simultaneous activation actions provided that it complies with the power limits specified in clause 5.2.7.

- Maximum time for connection activation: < 120 s (preferred < 5 s).
- Maximum time for connection de-activation: < 120 s (preferred < 5 s).
- Maximum activation time after a failure and block replacement: < 5 s per port.
- Maximum activation time < 5 s for test access.

5.5.2 Test ports functionalities

The ADF test port will be connected with any subscriber port, equipment port and (in a non-intrusive mode) with any existing connection.

- Minimum number of test ports: 2.
- Maximum number of test ports: 4.
- Test port activation time: < 5 s.
- Available test access modes:
 - Non-intrusive test access modes: monitor with high impedance; monitor without high impedance.
 - Intrusive test access mode:
 - Look in = test to the OE side.
 - Look Out = test to the Sub side.
 - Number of wires on the test access bus: 2 wires and 4 wires.

5.5.3 Diagnostic functionalities

Cadastre audits: the ADF will permit an internal check of the database.

Automatic release:

- a watchdog system will be integrated in the ADF in order to re-initialize the ADF control in case of abnormal duration of a task (communication, activation of connection, etc.);
- in case of watchdog activation, a dedicated message will be reported to the management system;

- Emergency configuration: in order to avoid inopportune configuration of the ADF in case of anomalous conditions of operation, an emergency configuration will be applied (ideally the last configuration). This emergency configuration will be active in the following cases:
 - power down;
 - release update;
 - absence of communication with the management system.
- non-intrusive continuity test: it should be available in order to verify any connection provided by the ADF;
- intrusive auto-test: it should be available in order to verify internal functionalities.

5.5.4 Reliability and behavior in case of failure

The ADF lifetime should be at least 20 years.

The availability should be 99,95 %.

The failure of one port should not affect the entire system and neither the other ports.

5.5.5 Card handling and replacement

The ADF should have a frontal access.

It should be possible to operate a non-disruptive card/block replacement (the new card/block will reestablish the existing end-to-end connections).

In-service expansion should be possible without causing any service interruption.

5.5.6 Automatic rerouting

In case of failure of a path, the system should be able to identify an alternative path and reroute the connection.

The replacement of a failed card (e.g. faulty card), should be automatically detected by the system and the new card must be configured with the stored parameters. This must be performed automatically without the need of any manual action.

Upon re-establishment of the initial configuration prior to the system failure, the original path and default ports for the affected or affected connections should be automatically repositioned.

5.5.7 Interconnection and Cabling

The wiring towards the ADF should be terminated on connectors/termination blocks (the interconnecting cables must not be hard wired, allowing an easy replacement of the system).

The ADF connectors should be standardized and composed each of multiple of ten lines (for compatibility with IDC line terminations); further studies should be made in order to analyze the best solution for compatibility with DSLAM connections typically based on a N x 8 modularity.

5.6 Management Requirements

This clause has mainly an "informative" purpose as each Operator has its own OSS (toward which the ADF has to be integrated). Therefore, some specific requirements (e.g. for security, faults, configuration, formatting, etc.) could differ from the ones reported in this clause.

5.6.1 Architectural scenario

Figure 6 describes the architectural scenario that could be envisaged in order to manage the ADF node, enabling two different paradigms:

- one based on proprietary Management System (Element Manager);
- an optional one will be based on direct access to the node by Service Provider OSS (by-passing the proprietary MS).

In order to easily interwork with the Service Provider OSSs, both ADF and MS should offer an open, standard-based North-bound interface, supporting all FCAPS functionalities.

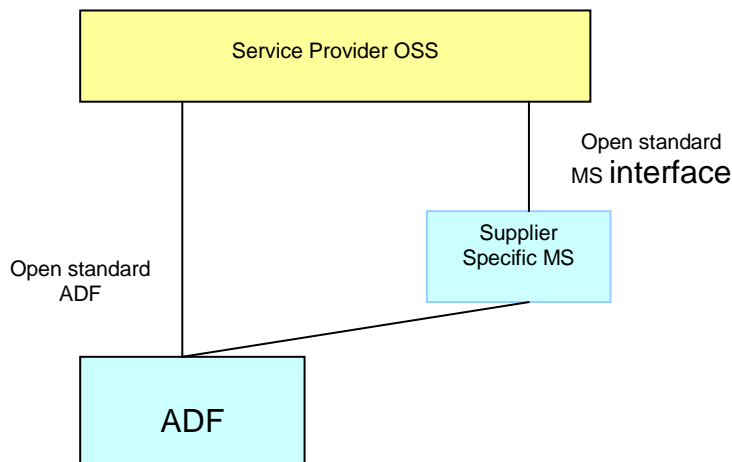


Figure 6: architectural scenario for ADF management

5.6.2 Faults

The Management System (MS) will generate at least one alarm for every failure event. Detailed list of all possible alarms should be provided.

The MS must issue event alarms related with MS CPU overload level.

It should be possible to forward all ADF and MS related alarm events to an external platform via SNMP (v2, v3). If the platform can achieve this using other mechanisms, it should be indicated.

The MS must implement alarm time correlation. It must have Log Tables for recording alarm events, with sequential time correlation of an issued alarm, as well as related operator actions (ACK, CLR).

The MS must provide the backup of the Log Tables.

The platform should provide easy user selection for filtering events based on date, ADF, type and severity. It should be clarified if this can be achieved via GUI and via telnet.

The MS must register and provide an alarm history, and be able to use statistic filters, and produce a report file to export.

The ADFs must send fault and alarms to the MS using SNMP traps. Available SNMP versions should be listed.

5.6.3 Configuration

The configuration application shall be web-based.

The ADF configuration should be possible both locally and remotely.

The GUI should promote a simplified interface (point-and-click) for the majority of the actions (service fulfilment/provisioning).

The MS must accomplish mass-configuration. It will be clarified if this functionality is available via GUI and via CLI/script.

The system should indicate the possibilities of external support for service activation and deactivation, and detail the way the system does it:

- by API; in this case show a detailed description of API and the used technology (RMI, RPC, CORBA);
- by CLI via MS;
- by CLI, using remote ADF access (without MS passthrough).

The MS must keep the NE configurations in a standby and protected file. The ADF reboot must be possible on a time-scheduled basis.

The platform should support ADF and network configuration, as well as the definition or threshold setting of new collector alarms via FTP, TFTP and telnet (using SSH). Other available protocol/applications should be indicated.

5.6.4 Security

The MS must implement authentication mechanisms. The available mechanisms must be listed.

The MS must be able to create user profiles in a flexible way, namely based on:

- functional user criteria (configuration, alarms, inventory);
- geographic level;
- type of ADF equipment;
- Any combination of the former three.

The MS must have audit mechanisms for login/logout (included illegal attempts), as well as a protected registry of data and configuration changes.

Communication between ADF and MS should be encrypted and authenticated (SNMPv3, SSH). Available schemes have to be listed.

An access restriction table must be configured per ADF and MS module.

Existing alarms related with the detection of an intrusion or any sort of Internet attack (SPAM, Denial of Service, other) should be listed.

The platform's roadmap should be described.

Product and equipment licence - Licence policies must be indicated for the platform and related support products, (workstation 1, 2, 4, 6, n users).

5.6.5 Interfaces and MIBs usage permission

The MS should have a GUI based on WEB technology.

The ADF must be remotely configurable from another external MS, and integrate industry available interfaces and protocols for this type of access.

Remote software download should be possible.

The system should supply entirely public and private MIBs related with service and network management, and authorize the utilization of these MIBs by the telecom operator, with no extra charges.

The system should list and document all available APIs, through which it is possible to access the information referred above for query and update data (including the configuration the ADF from OSS).

The system should list and document all the other available tools for existing OSS integration (toolkits, database integration and interconnection, standards development compliance).

The a system should list and document all the other available tools for line test (connection continuity and connection verification prior to effective connection completion), including integration with operator legacy systems.

5.6.6 Inventory

The platform should have an auto-discovery mechanism.

The inventory information must be kept in a file (or DB), accessible from external MSs.

The inventory fields in the file (or DB) should be clearly identified, confirming the existence of the following attributes in the file fields: ADF, ADF serial number, manufacturer name, rack position, shelf position, port ID, interface ID, service ID, ExchangeID, NetworkElementID, cable ID, PairId ID).

Annex A (informative): Proforma for possible ADF configurations and parameters

Notwithstanding the provisions of the copyright clause related to the text of the present document, ETSI grants that users of the present document may freely reproduce the ADF proforma in this annex so that it can be used for its intended purposes and may further publish the completed ADF.

For the proposed solution for ADF systems, manufacturers should indicate the default minimum and maximum configurations, with respective sizes and capacity, indicated in number of ports (1 pair of copper lines = 2 ports) for the different autonomous system configurations and the required system stages: (input, output and matrix), including the details for the respective expansion capabilities.

Table A.1: Any-to-any

	Config.	Input stage (Equipment side)	Output Stage (Subscriber side)	Total Capacity	Dimensions	Expansion Capabilities
ADF	A	600	600	1 200		
	B	900	600	1 500		
	C					
	D					
	...					

Table A.2: Any-to-many

	Config.	Input/Output stage	Special services (local xDSL)	Total Capacity	Dimensions	Expansion Capabilities
ADF	A	400/400	100			
	B	400/400	150			
	C					
	D					
	...					

The systems architecture should also be provided for the above configurations: line modules, control modules and powering, optional systems and redundancy elements, complemented in terms of required installation space and their physical distribution

The details regarding the configurations above, and in particular the indication of the switching variants supported: any-to-any and any-to-many should be accompanied by comprehensive explanation notes, preferably with the necessary diagrams/schematics to easily allow operators to evaluate the configuration and implementation proposed.

- Interconnecting cabling capacities.
- Maximum length.
- Types of cables supported: twisted cables, broadband capable.
- Building of cables.

Manufacturers should provide the current and voltage limits on their equipment ports.

Table A.3: List of current and voltage limits

Maximum operating current	
Maximum operating voltage wire-to-wire	
Maximum operating voltage wire-to-ground	

The electrical resistibility characteristics should be indicated with the appropriate protection circuits technical solutions (if present), in order to ensure the necessary behaviour and current control for equipment protection within the frequency range of usage (DC to 30 MHz).

Concerning the Management System (MS), the following information is requested:

Table A.4a: Information labelling

MS name and version		
MS modules name and their OAM functions		
Module's description Functions Architecture (client/server, WEB (pref.), 3 tier (pref.)) API		
Module's Name	SW description languages, API, etc.	HW description CPU (Intel or RISC), hard disc capacity, etc.
DB description		
Operating System		

Table A.4b: Information labelling

Maximum number of managed ADF	
Maximum number of managed ports	
Maximum number of managed I/O interfaces	
Maximum number of received alarms/events per seconds	
Maximum number of selected OCs for collecting feature	
List of managed services	
Maximum number of simultaneous GUI clients	

The manufacturers should clearly state if the designed ADF's systems are managed using a specific proprietary or from another supplier's MS or if they can be managed by the operator's usual MS (using SNMP or any other protocol). The following requirements are assuming that the proposed ADF's are managed by a specific MS.

The supplier should clearly state which are the performance parameters set in the management system:

- Identify the HW and SW platforms that support the MS for the OAM. The description should detail the OS and DB used.

History

Document history		
V1.1.1	September 2007	Publication