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Technical and physical requirements for house installation for the provision of public telephone service and Internet access via a copper or fibre-optic connection

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1 Introduction

1.1 Background

The Ordinance on Telecommunications Services (OTS) [3] – Articles 16 and 17 in particular – serves as the basis for this document.

1.2 Object, purpose and delimitation

This document sets out the technical and physical requirements for house installation when it comes to providing public telephone service and Internet access via a copper or fibre-optic connection as part of basic service provision (as per the specifications outlined in the technical and administrative regulations [4]; see also Figure 1).

The document is targeted at house/homeowners, planners and installation experts for in-house/home communications systems.

Swisscom's responsibility for the provision of telecommunications installations (here the physical basic service connection) ends at the building entry point (BEP) or the network separation point (NSP). Swisscom is under no obligation to provide the house installation. However, the house installation has an impact on transmission quality and hence on the services available at the network termination point (NTP) provided by Swisscom as part of basic service provision. The house installation must meet the relevant requirements in order to ensure effective provision and compliance with the Swiss Federal Office of Communications (OFCOM) quality requirements placed on the basic services available at the NTP.

Swisscom is not responsible for the power supply to the devices in the house installation, nor for the emergency supply in case of power failure. The previous obligation with PSTN or ISDN terminals to maintain the basic functions of the connection during an hour in the event of a power failure is canceled as of 1 January 2018.

1.3 Scope

The requirements apply to the public telephone service included in basic service provision at wired connections for analogue telephone devices (up to the end of 2021) and at wired digital connections for ISDN end devices (up to the end of 2021), as well as access to public telephone service and the Internet via the Base-T Ethernet interface in accordance with the IEEE 802.3 standard [4]. Electromagnetic compatibility (EMC) and electrical safety do not form part of the scope of this document.

1.4 Terms and abbreviations

ADSL	Asymmetric digital subscriber line
OFCOM	Federal Office of Communications
BEP	Building entry point = network separation point [NSP] (outdated term)
DD	DSL digital socket
DSL	Digital subscriber line
TE	Terminal equipment = end device = Endgerät [EG]
EMC	Electromagnetic compatibility
OTS	Ordinance on Telecommunications Services
FXS	Foreign exchange station (analogue telephone end devices)



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BSP	Basic service provision
ISDN	Integrated services digital network
NTP	Network termination point
NTU	Network termination unit = Netzabschlussgerät [NAG]
OTO	Optical telecommunications outlet (socket for 4 optical fibres)

1.5 Referenced documents

- [1] Swisscom The User Network Interface of simulated ISDN ; Version 1, 30.09.2017
- [2] Swisscom Interface properties of the analogue network interface; version 1, 30.09.2017
- [3] OFCOM – SR 784.101.1 Ordinance of 9 March 2007 on Telecommunications Services (OTS); as at 2 December 2016
- [4] OFCOM – SR 784.101.113/1.6 Technische und administrative Vorschriften (TAV) betreffend die Eigenschaften von Schnittstellen der Grundversorgung (Technical and administrative regulations regarding the characteristics of the universal service interfaces); as at 12 December 2016
- [5] OFCOM Technical Guidelines concerning FTTH In-House Installations. Physical Media of Layer 1, Edition 3.0 as at 5 March 2012
- [6] Swisscom Handbuch FTTH Realisation – Inhouse Neu-/Umbauten (FTTH realisation – In-house new constructions/conversions manual)
- [7] Swisscom Interface properties of the broadband interface; Version 1, 30.09.2017

2 The requirements for house installation

2.1 Definition of the installation areas of the three connection types

The Building Entry point BEP is the point of transition of the access network into the house installation on the customer's premises (see Figure 1). The access network, including the BEP, is the responsibility of Swisscom or of a cooperation partner. It is also the property of Swisscom or of a cooperation partner.

The BEP (old term: Network separation point NSP) corresponds to the building entry point as per the OTS (see Article 17[3]).

The Network termination point NTP corresponds to the network termination point as per the OTS (see Article 16[3]).

The Network termination unit NTU features an Ethernet interface, as well as an FXS and/or ISDN interface, if required (up to the end of 2021). It corresponds to the NTU [NAG] as per the Technical and administrative regulations [4].

The NTP of the telephone service with an analogue interface [4] is the FXS port on the NTU.

The NTP of the telephone service with an ISDN interface [4] is the ISDN port on the NTU.

The NTP for the public telephone service via IP and for Internet access is the Base-T Ethernet interface [4] at the outlet of the NTU.

The house installation starts at the BEP, leads to the DD (copper) or OTO (fibre-optics) and ends at the NTP. The connection is always a point-to-point connection.

The home installation (= in-home / internal home network) starts with the NTU at the NTP and connects the network termination unit NTU with the terminal equipments TE.

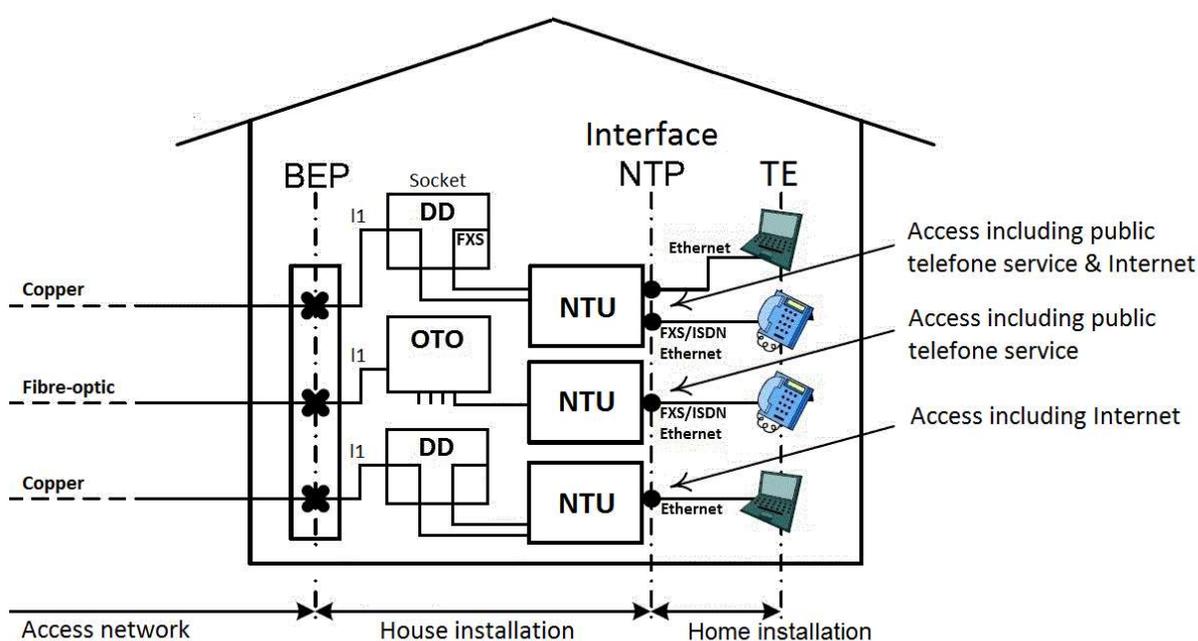


Figure 1: Definition of the installation areas of the three connection types

2.2 General

Swisscom or a cooperation partner connects a building at the BEP, generally with either copper or FTTH (the technology of the access network).

In principle, the same technology must be used in the house installation as in the access network.

End-to-end connections with no change of technology from Swisscom to the basic service connection in the end customer's house/home/apartment are a prerequisite for meeting the quality requirements imposed by OFCOM on the basic services available at the NTP.

The copper line or optical fibre must be available exclusively for the corresponding connection (no use of other frequency bands/wavelengths on the same line). This excludes other connections/services from Swisscom.



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2.3 House installation with copper access network

2.3.1 Specifications for copper cable

The applicable values for house installation are:

DC resistance of wires $\leq 10 \Omega/100 \text{ m}$ at 20° C

Wave attenuation $\leq 1 \text{ dB}/100 \text{ m}$ at 40 kHz

For house installation, twisted cable with a conductor diameter of at least 0.5 mm is required per access line. The maximum line length from the BEP to the DD must not exceed 100 m (see Figure 1, $l_1 \leq 100 \text{ m}$). U72 type cable or Cat5 type cable pairs, with a wave impedance of 100 to 135 Ω (+/- 15%), are recommended. I83 cables that are already installed may continue to be used, but I83 cables should no longer be used for new installations.

Larger diameters and/or better cable types (twisted and shielded) are advantageous (for better electromagnetic interference immunity and transmission properties).

2.3.2 DSL socket DD with copper access network a prerequisite for Internet access

In order to ensure that the basic service Internet access can be provided in the necessary quality at the wired network interface (copper), the house installation must be executed in such a way (as per Figure 2) that the DSL signal is routed straight from the BEP to the NTU without being influenced by branch lines (sub-branches for other sockets, poor contacts, etc.; bridge taps). Installation of the DSL socket DD ensures optimal signal routing within the house installation.

In residential units with structured cabling, the DD should be mounted in the home distributor (central communication cabinet). If the NTU (router) is to be set up at a different location for better distribution of radio signals, the signals of the DD can be extended to the new location with an 8-pin twisted-pair connection (RJ45 Ethernet cable, at least of type Cat5e).

In the case of retrofits and in new buildings without structured cabling, the DD should be mounted in the living room.

Pictorial schematic

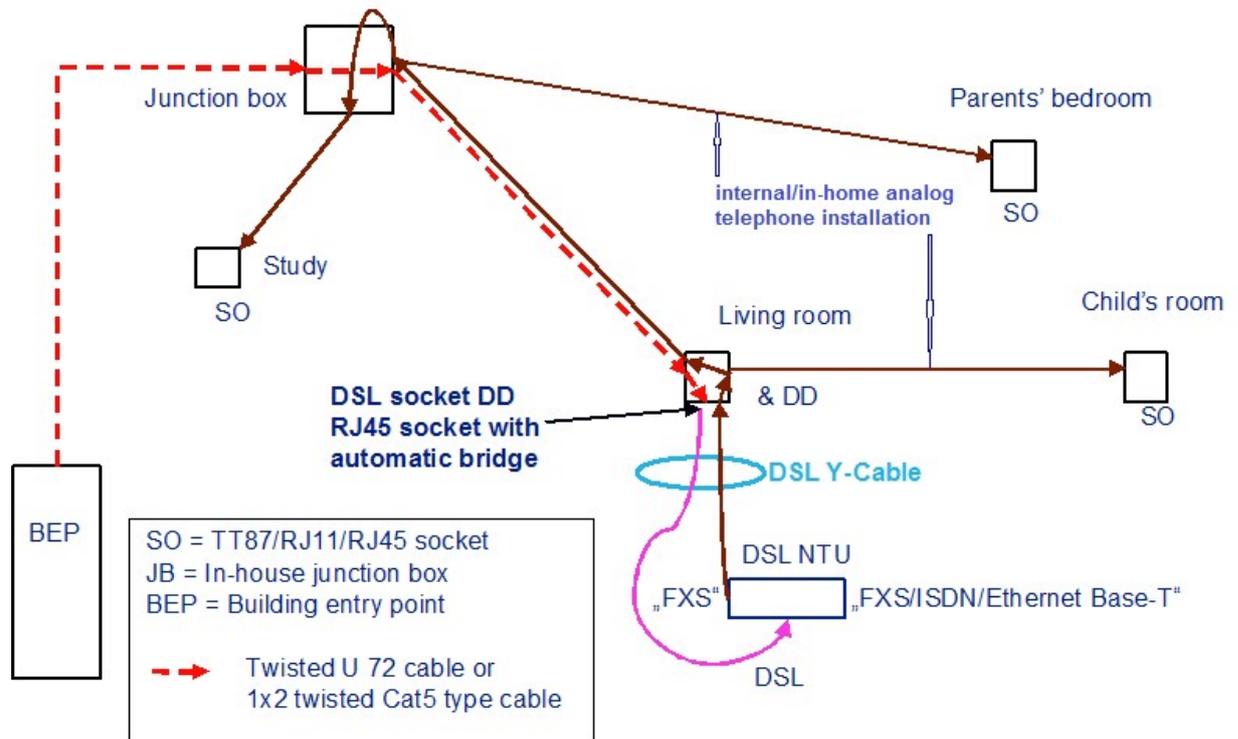


Figure 2: Pictorial schematic of the DSL socket DD

Interface	Pin number							
	1	2	3	4	5	6	7	8
BEP a/b	–	–	–	a	b	–	–	–
in-home a/b	–	–	a	–	–	b	–	–

Table 1: Pin configuration for the RJ45 DSL socket DD

The DSL socket DD (RJ45 socket) contains an automatic bridge, which, in the absence of the DSL NTU RJ45 jack, connects pin 3 to 4 and pin 5 to 6. With a view to ensuring that the function is clearly labelled, it is recommended that at least the front of this RJ45 socket should be coloured purple (Pantone 268) (the blue colour [Pantone 285C] used previously should no longer be used, but continues to be permitted).



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2.4 House installation with fibre-optic access network

2.4.1 Specifications for the fibre-optic access network and house installation

The technical documents from OFCOM concerning FTTH can be found on the Internet under “OFCOM – FTTH working groups”, and contain all of the specifications necessary for the access network and house installation.

Reference can also be made to the Swisscom document entitled “Handbuch FTTH Realisation – Inhouse Neu-/Umbauten” (FTTH realisation – In-house new constructions/conversions manual) [6].

Compliance with the OFCOM „Technische Richtlinien betreffend FTTH-Installationen in Gebäuden. Physikalische Medien der Schicht 1”; version 3.0 (PDF, 670 kB, 05.03.2012) (Technical guidelines concerning FTTH in-house installations. Physical media of layer 1) [5] is a prerequisite for the provision of basic services.

2.4.2 Socket for optical fibres OTO (Optical Telecommunications Outlet)

In residential units with structured cabling, the OTO should be mounted in the home’s distributor (central communication cabinet). If the NTU (router) is to be set up at a different location for better distribution of radio signals, the optical signals of the OTO can be extended to the new location with an “Optical Extension Kit”.

In the case of retrofits and in new buildings without structured cabling, the OTO should be mounted in the living room.

2.5 Network termination unit [NTU] for public telephony and Internet access services

For the basic services of public telephony and Internet access, an NTU that supports at least the scope of these basic services is provided by Swisscom at the end of the house installation as part of its obligation to provide basic services. This NTU provided for the analogue and ISDN interface is the property of Swisscom.

Alternatively, an NTU can be purchased from Swisscom or on the market for public telephony service via IP and for Internet access via the Base-T Ethernet interface.

The list of NTUs available on the market that have been tested by Swisscom can be found at www.swisscom.com -> Wholesale -> “Broadband Connectivity Service”.

For proof of the functional capability of the basic services at the NTP or for problem diagnosis, however, a Swisscom NTU must always be used.



2.6 Sockets at the NTP for wired FXS and ISDN end devices

The telephone socket used on the analogue FXS port is the RJ11 type.

Interface	Pin number					
	1	2	3	4	5	6
a/b	–	–	a	b	–	–

Table 2: Pin configuration for the RJ11 (6P2C) telephone socket on the FXS port

The telephone socket used on the digital ISDN port is the RJ45 type.

Interface	Pin number							
	1	2	3	4	5	6	7	8
S/T			Rx+	Tx+	Tx–	Rx–		

Table 3: Pin configuration for the RJ45 (8P8C) socket on the ISDN port

2.7 Connection scenarios at the NTP

For the public telephony service, one analogue end device is supported per FXS port, and one digital end device per ISDN port. The documents entitled “Interface properties of the analogue network interface” [2] and “The User Network Interface of simulated ISDN” [1] serve as a basis in this regard. However, the public telephony service can also be used via the Base-T Ethernet interface.

The Internet access service is offered via the Base-T Ethernet interface in accordance with the IEEE 802.3 standard. The document entitled “Interface properties of the broadband interface” [7] serves as a basis in this regard.

3 Annex: Examples of a DSL socket DD

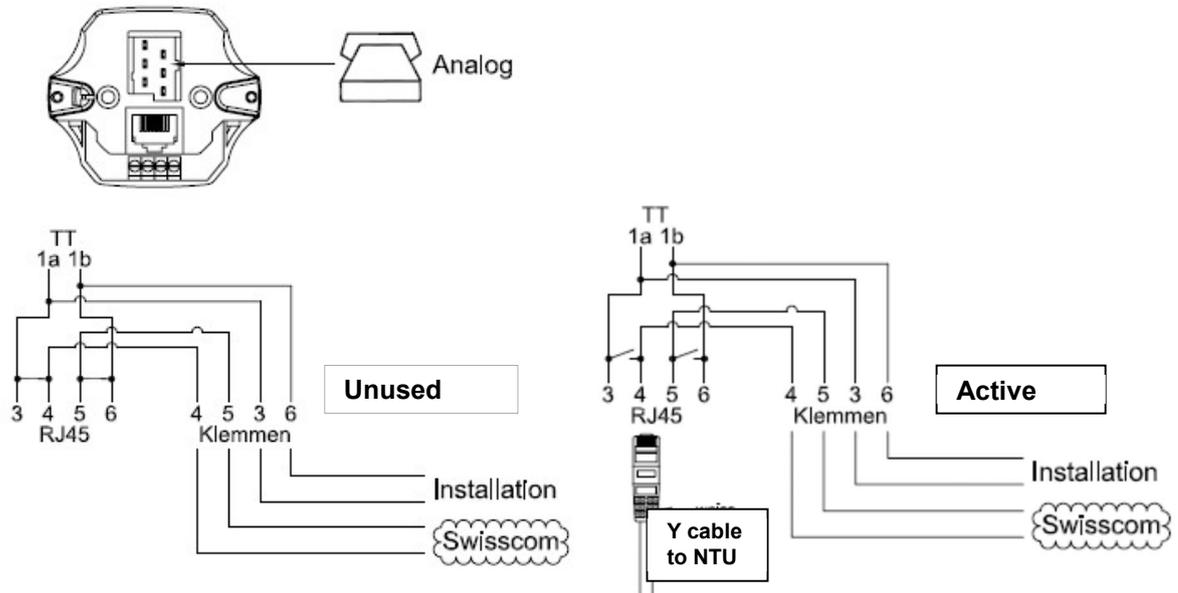
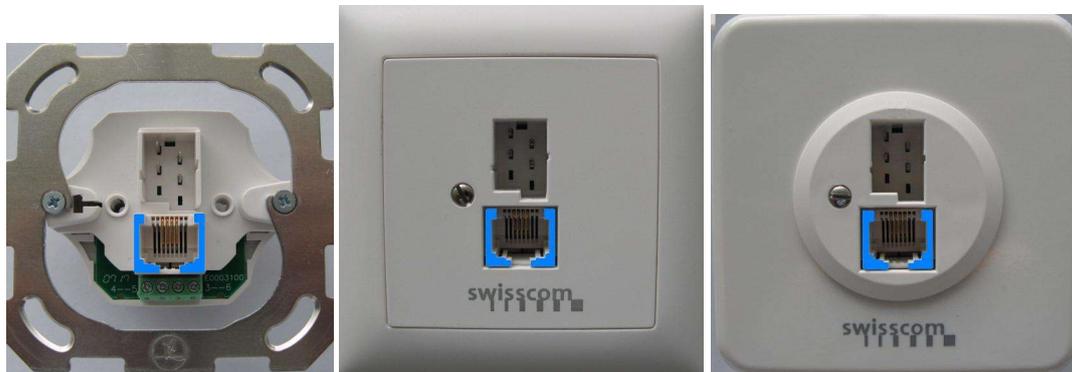


Figure 3: Example of a DSL socket DD



Figures 4–6: Examples of market products and options

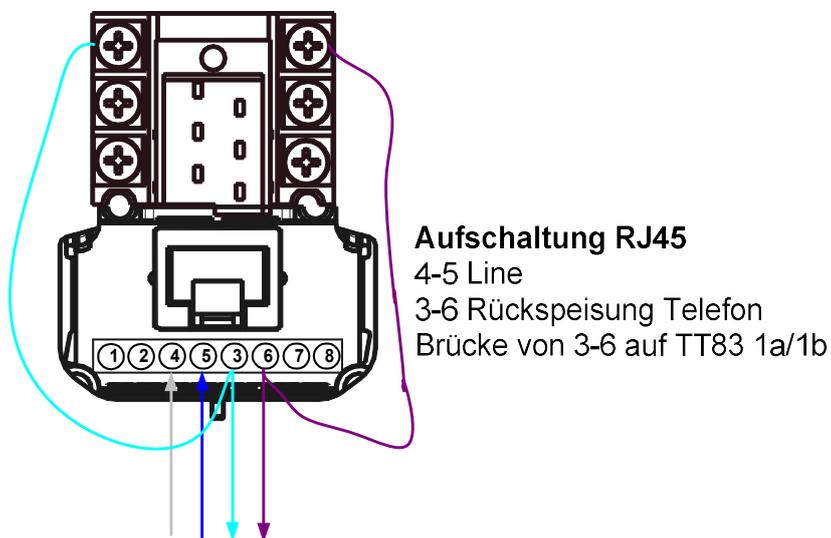
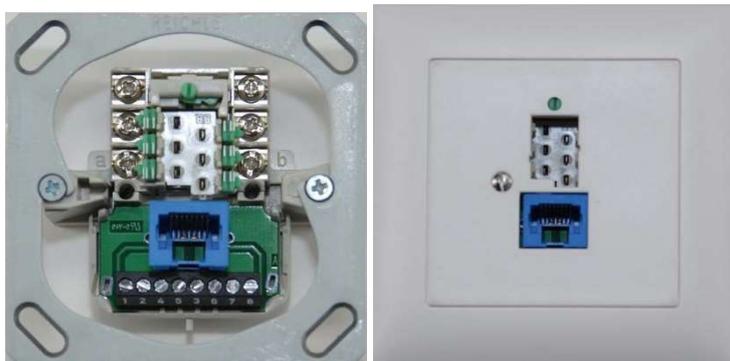


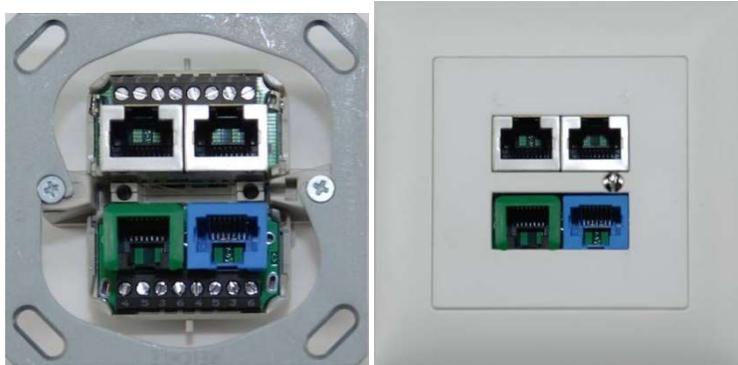
Figure 7: Example of connection diagram for a DSL socket DD



DSL socket DD with RJ45 socket and TT83 for in-home analogue telephone connection



DSL socket DD with its RJ45 socket and a RJ45 (with RJ11 reduction) for in-home analogue telephone connection



DSL socket DD with RJ45 socket and a RJ45 (with RJ11 reduction) for in-home analogue telephone connection and 2 × RJ45 for Fast Ethernet connection

Figures 8–13: Examples of market products and options

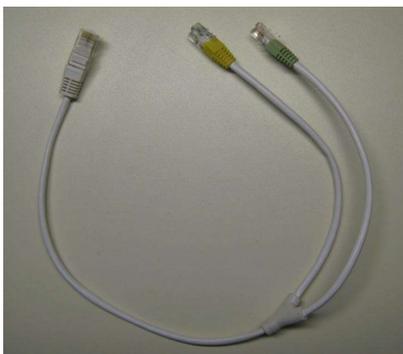


Figure 14: Example of Y cable, signals for the DSL socket DD (pin 4 and 5; pin 3 and 6) for NTU: DSL and FXS

4 Annex: Examples of the 4-way OTO (max 4 fibres)



Figures 15–17: Examples of market products and options (hybrid OTO with DD and telephone)