

TELENOR

SPECIFICATION

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**Requirements for equipment to be
connected to the local sub-loop in the
access network of Telenor.
Equipment providing ADSL and PSTN
or ISDN Basic Access services, full
unbundled access (service type E_{DF})**

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Abstract : Requirements for the equipment of an Operator leasing copper pairs in the access network of Telenor in order to provide ADSL services

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TELENOR SPECIFICATION		
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1 Scope

This specification gives requirements for equipment owned by Operator and intended for connection to local loop in the access network of Telenor. The requirements apply for equipment supplying ADSL and PSTN or ISDN Basic Access (BA) services on one copper pair.

The Operator is responsible that the equipment is in conformance to this specification.

For equipment to be installed in Telelosji the formulary 'Statement of Compliance' in annex 2 shall be completed and forwarded to Telenor.

There is a serious concern that international specifications and recommendations to this moment will not support the sub loop option. To avoid coexistence incompatibility against transmission systems in the same cable some national restrictions have to be taken in this specification.

2 References

This specification incorporates by dated or undated references, provisions from other publications/standards. These normative references are cited at the appropriate places in the text and the references are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this specification only when incorporated in it by amendment or revision. For undated references, including amendments, the last edition of the document referred to applies.

2.1 Normative references

- [1] ITU-T G.992.1: "*Asymmetric Digital Subscriber Line (ADSL) transceivers*"
- [2] ITU-T G.992.3: "*Asymmetric Digital Subscriber Line (ADSL) transceivers – 2 (ADSL2)*"
- [3] ITU-T G.992.5: "*Asymmetric Digital Subscriber Line (ADSL) transceivers – Extended bandwidth ADSL2 (ADSL 2plus)*"
- [4] ETSI TS 101952-1-4 V1.1.1 (2002-11): "*Access network xDSL transmission filters; Part 1: ADSL splitters for European deployment; Sub-par 4: Specification of ADSL over "ISDN or POTS" universal splitters*"
- [5] Telenor Specification OA 100: "*General requirements for equipment to be connected to the local loop in the access network of Telenor and/or material and equipment to be installed and operated in Telelosji*"
- [6] Telenor Specification OA 101 (2006-01): "*Requirements for equipment to be connected to the local loop in the access network of Telenor. Equipment providing PSTN services, full unbundled access (service type A_{AF})*"
- [7] Telenor Specification OA 102 (2006-01): "*Requirements for equipment to be connected to the local loop in the access network of Telenor. Equipment providing ISDN Basic*"

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Access services or 160 kbit/s digital transmission, full unbundled access (service type B_{AF})”

2.2 Informative references

- [8] Telenor Nett Specification A59 (2001-05): “Access to copper pairs in the access network of Telenor. Specification of the network side of the user-network interface”

3 Definitions and abbreviations

Telelosji	Colocation at the premises of Telenor
Operatøraksess	Operators’ access to the access network of Telenor
ADSL	Asymmetric Digital Subscriber Line
ATU-C	ADSL Terminal Unit at Central office
DB	Distribution Box
DMT	Discrete Multi-Tone
MDF	Main Distribution Frame
NTP	Network Termination Point
NTU	Network Termination Unit

4 Application

This specification applies to ADSL equipment provided by Operator. Operator’s ADSL access node is placed in the vicinity of a distribution box (DB) of Telenor, and ADSL equipment at the subscriber’s premises (NTU), as shown in figure 1. Internal connections and cables within the distribution box owned by Telenor must be established by use of the Telelosji service (colocation).

A single pair transmission system shall be used. The ADSL system may be designed to allow for simultaneous transmission of PSTN or ISDN Basic Access (BA) services on the same pair. However, it is optional for the Operator whether he wants to deliver these services or not.

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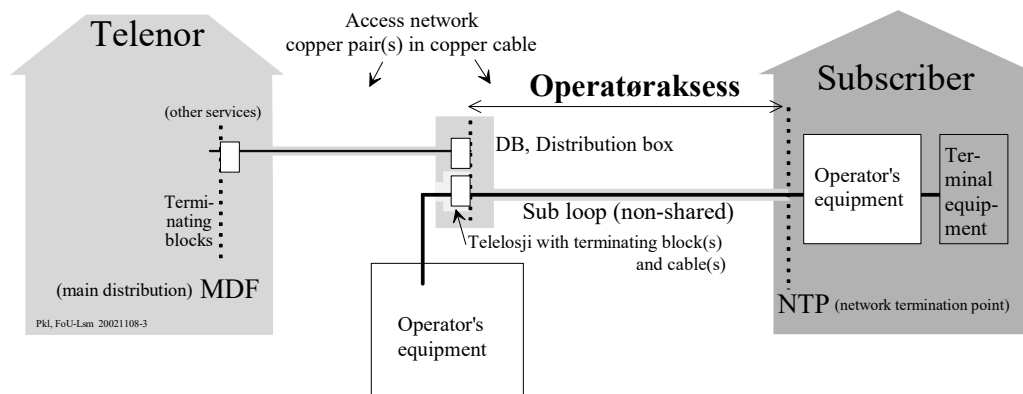


Figure 1 Configuration of the access network.

4.1 Full unbundled service provided by one Operator

If ADSL systems from Operator are directly attached to the distribution box it will introduce interference conflicts that is elsewhere not present in the access network of Telenor. Such an implementation has to take care of existing SHDSL, HDSL and VDSL connections or other transmission systems supported from the MDF at the central office (see figure 1).

Operatoraksess may as well be present from the same MDF.

The transmit level from the ADSL modem in the vicinity of the DB must be limited, and the allowed range must be limited too.

If the distance from DB to the closest MDF is less than 1,5 km, ADSL transmission systems may be installed according to this specification if the spectral masks as given in table 7.1. and in 7.1 are implemented.

If the distance from DB to the closest MDF is greater than 1,5 km, ADSL transmission systems can not be deployed due to technical limitations (interference with existing services, see note).

Note! Without the length restriction the power spectral signal from an ADSL system located at DB may for instance dominate by more than 20 dBm/Hz over the major part of the spectrum of an ADSL system launched at the MDF.

5 General requirements

All installed equipment operating in Telelosji or used for Operatoraksess shall fulfil requirements stated in Telenor Specification OA 100 [5] related to:

- safety
- environmental conditions
- documentation.

6 Transmission system

The transmission system shall be based on DMT coding as specified in ITU-T Rec. G.992.3 [2] and G.992.5 [3].

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Note! The requirements in this specification are established to ensure the transmission quality and electrical compatibility within the copper cable. This specification does not exclude technical implementations related to modes of operation (Annex B, Annex J etc.) as far as all electrical requirements in this specification are obeyed and fulfilled.

6.1 Combined ADSL and PSTN/ISDN basic access

The discrete multi-tones (DMT) numbered from 0 to 28 shall not be used in either transmission direction. These tones correspond to a frequency band from 0 to 120 750 Hz.

If PSTN services (service type A) are present on the same cable pair, the requirements given in Telenor Specification OA 101 [6] apply. The requirements apply at the interface between the splitter and the copper cable of Telenor. The splitter used shall comply with the requirements given in 7.1.5.

If ISDN Basic Access or 160 kbit/s digital transmission services (service type B) are present on the same cable pair, the requirements given in Telenor Specification OA 102 [7] apply. The requirements apply at the interface between the exchange/NT1 (U interface) and the splitter. The splitter shall comply with the requirements given in 7.1.5.

6.2 ADSL operated in “All digital mode” (Annex J)

In “All digital mode” it is possible to use the discrete multi-tones from 4,3125 kHz to 276 kHz for the upstream direction as specified in ITU-T Rec. G.992.3 [2] and G.992.5 [3].

7 Electrical characteristics

The ADSL modem may operate in different modes.

For ADSL modem designed to operate in combination with base band transmission of PSTN or ISDN basic access, the requirements in 7.1 and its subclauses strictly apply.

For ADSL modem designed to operate in “All digital mode”, the requirements in 7.2 and its subclauses strictly apply.

7.1 Combined ADSL and PSTN/ISDN basic access

7.1.1 Remote feeding

Remote feeding of the ADSL equipment at the subscriber’s premises is not allowed.

7.1.2 Downstream transmit spectral mask

The transmit mask for ATU-C shall comply with table 7.1.

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Frequency (kHz)	PSD line start point (dBm/Hz)	Frequency (kHz)	PSD line end point (dBm/Hz)	
0	-90	50	-90	flat
50	-90	80	-81,8	12 dB/octave
80	-81,8	120	-59,4	38,3 dB/octave
120	-59,4	2 500	-59,4	flat
2 500	-59,4	3 001,5	-80,0	78 dB/octave
3 001,5	-80,0	3 175	-90,0	linear
3 175	-90,0	12 000	-90,0	flat

Table 7.1 PSD mask for ATU-C.

7.1.3 Upstream transmit spectral mask

The upstream transmit spectral mask shall be in accordance with ITU-T Rec. G.992.3 [2] or G.992.5 [3], Annex B.2.2.

The transmit spectral mask for ADSL modems designed strictly according to ITU-T Rec. G.992.1 [1], may deviate in the frequency range 276 kHz to 12 MHz, however within this frequency range the power spectral density shall not exceed the limits in figure B.4 in ITU-T Rec. G.992.1 [1].

The aggregate transmit power shall be in accordance with ITU-T Rec. G.992.3 [2] or G.992.5 [3], Annex B.2.2.2.

7.1.4 Unbalance about earth, transmitter/receiver

The unbalance about earth, measured as longitudinal conversion loss (LCL), shall not be less than 40 dB in the frequency range 120 kHz to 2,2 MHz.

7.1.5 Requirements for universal splitter, PSTN/ISDN basic access

The splitter shall be in accordance with ETSI TS 101952-1-4 clauses 1 to 6.11.1 [4].

Note! The value of the two impedances, Z_{ISDN} and Z_L , referenced in ETSI TS 101952-1-4 [4] clauses 5.2.2 and 5.2.3 shall have a provisional value of 135 ohms under tests.

7.2 ADSL operated in "All digital mode" (Annex J)

7.2.1 Remote feeding

Remote feeding of the ADSL equipment at the subscriber's premises is not allowed.

7.2.2 Downstream transmit spectral mask

The transmit mask for ATU-C shall comply with table 7.1.

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Frequency (kHz)	PSD line start point (dBm/Hz)	Frequency (kHz)	PSD line end point (dBm/Hz)	
0	-59,4	1 104	-59,4	flat
1 104	-59,4	2 500	-59,4	flat
2 500	-59,4	3 001,5	-80,0	78 dB/octave
3 001,5	-80,0	3 175	-90,0	linear
3 175	-90,0	12 000	-90,0	flat

Table 7.2 PSD mask for ATU-C.

7.2.3 Upstream transmit spectral mask

The upstream transmit spectral mask shall be in accordance with ITU-T Rec. G.992.3 [2] or G.992.5 [3], Annex J.2.2 and in accordance with Table J3/G.992.3 [2], last row (ADLU-64) or Table J3/G.992.5 [3], last row (ADLU-64).

The transmit spectral mask for ADSL modems designed strictly according to ITU-T Rec. G.992.1 [1], may deviate in the frequency range 276 kHz to 12 MHz, however within this frequency range the power spectral density shall not exceed the limits in figure B.4 in ITU-T Rec. G.992.1 [1].

The aggregate transmit power shall be in accordance with ITU-T Rec. G.992.3 [2] or G.992.5 [3], Annex J.2.2.2.

7.2.4 Unbalance about earth, transmitter/receiver

The unbalance about earth, measured as longitudinal conversion loss (LCL), shall not be less than 40 dB in the frequency range 1,0 kHz to 2,2 MHz.

7.2.5 Requirements for universal splitter, PSTN/ISDN basic access

The use of a splitter is not recommended.

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Annex 1: Document history

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5.0	01.03 2005	Kjell E. Sterten, TN-NL-U-T
5.1	31.10 2005	Kjell E. Sterten, TNO-FX-PT-I&P

STATEMENT OF COMPLIANCE

**TELENOR
Specification OA 305**

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Annex 2

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Date: _____ Operator: _____

System identification (vendor, model, type): _____

Connection to the access network of Telenor: Yes (direct)..... Indirect (aux. equip.).....

The given information is valid.

Date/Signature: _____

(sign.)

FC = Fully compliant NC = Non-compliance

Clause no.	Description	Statement of Compliance		Remarks and additional information	For internal use
		FC	NC		
1	Scope	<input type="checkbox"/>	<input type="checkbox"/>		
2	References				
2.1	Normative references	<input type="checkbox"/>	<input type="checkbox"/>		
2.2	Informative references	<input type="checkbox"/>	<input type="checkbox"/>		
3	Definitions and abbreviations	<input type="checkbox"/>	<input type="checkbox"/>		
4	Application	<input type="checkbox"/>	<input type="checkbox"/>		
5	General requirements	<input type="checkbox"/>	<input type="checkbox"/>		
6	Transmission system	<input type="checkbox"/>	<input type="checkbox"/>		
6.1	Combined ADSL and PSTN/ISDN basic access	<input type="checkbox"/>	<input type="checkbox"/>		
6.2	ADSL operated in "All digital mode" (Annex J)	<input type="checkbox"/>	<input type="checkbox"/>		
7	Electrical characteristics	<input type="checkbox"/>	<input type="checkbox"/>		
7.1	Combined ADSL and PSTN/ISDN basic access				
7.1.1	Power feeding	<input type="checkbox"/>	<input type="checkbox"/>		
7.1.2	Downstream transmit spectral mask	<input type="checkbox"/>	<input type="checkbox"/>		
7.1.3	Upstream transmit spectral mask	<input type="checkbox"/>	<input type="checkbox"/>		
7.1.4	Unbalance about earth, transmitter/receiver	<input type="checkbox"/>	<input type="checkbox"/>		
7.1.5	Requirements for universal splitter, PSTN/ISDN basic access (integrated or external)	<input type="checkbox"/>	<input type="checkbox"/>		
7.2	ADSL operated in "All digital mode" (Annex J)				
7.2.1	Power feeding	<input type="checkbox"/>	<input type="checkbox"/>		
7.2.2	Downstream transmit spectral mask	<input type="checkbox"/>	<input type="checkbox"/>		
7.2.3	Upstream transmit spectral mask	<input type="checkbox"/>	<input type="checkbox"/>		
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