

DEP SPECIFICATION

TELECOMMUNICATIONS STANDARDS

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DESIGN AND ENGINEERING PRACTICE



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The information set forth in these publications is provided to Shell companies for their consideration and decision to implement. This is of particular importance where DEPs may not cover every requirement or diversity of condition at each locality. The system of DEPs is expected to be sufficiently flexible to allow individual Operating Units to adapt the information set forth in DEPs to their own environment and requirements.

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1. INTRODUCTION

1.1 SCOPE

This DEP specifies requirements and gives recommendations for private telecommunication networks and public telecommunication network services.

International telecommunication standards are set by agreement through the auspices of the International Telecommunication Union (ITU), a specialised agency of the United Nations dealing with telecommunications. These standards are published by the ITU and take the form of Regulations, Recommendations, Resolutions, Reports and Final Acts.

National telecommunication standards are based on ITU recommendations but may contain significant variations. Some ITU recommendations specifically allow for local or regional interpretation. Private networks should follow ITU recommendations as far as possible to gain cost advantage by purchasing standard equipment and to allow interworking with other equipment and networks, especially the public telecommunication network. Public Telecommunication Operators (PTOs) may insist on adherence to local variations and special interface standards. Care should be taken to verify applicable local standards for connection.

The International Telecommunication Union, via its Consultative Committees, adopts standards according to the principle of consensus. As a result of this process, the titles of standards are sometimes more a result of the political process rather than a specific reference to its contents. This could hamper the practical value of this DEP and for this reason, some titles have been slightly modified to provide better guidance to their content. However, all standards are listed in logical order, and with their actual titles, in (6). Because of a re-organisation within the ITU, new standards will be issued by the Telecommunications Standards Division (ITU-T) and radio frequency spectrum matters by the Radiocommunication Division (ITU-R).

ITU standards are issued in an electronic format and the previous method of coloured books with volume numbers is no longer in use. Therefore, ITU standards are all referred to in this DEP by means of the series letter and number, not a book volume.

Some miscellaneous standards also apply, for instance those of the International Electrotechnical Commission (IEC). These standards are mentioned within the paragraphs concerned.

The provision of aeronautical and maritime communication and navigational aids for offshore platforms and small private airfields is often part of the responsibility of the telecommunication organisations. For this reason, the main standards of the International Maritime Organisation (IMO) and the International Civil Aviation Organisation are included in this DEP, although detailed discussion of these standards is outside the scope of this document.

The Shell Group IT Architecture (GITA) strategy document makes reference to telecommunication standards and principles for the Group's telecommunications architecture. This DEP takes account of the Group IT Architecture strategy as laid out within these documents, and they are referenced in section (6).

This is a revision of the DEP with the same number, dated May 2004; see (1.5) regarding the changes.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by Shell GSI, the distribution of this DEP is confined to Shell companies and, where necessary, to Contractors and Manufacturers/Suppliers nominated by them. Any authorised access to DEPs does not for that reason constitute an authorisation to any documents, data or information to which the DEPs may refer.

This DEP is intended for use in facilities related to oil and gas production, gas handling, oil refining, chemical processing, gasification, distribution and supply/marketing. This DEP may also be applied in other similar facilities.

When DEPs are applied, a Management of Change (MOC) process shall be implemented; this is of particular importance when existing facilities are to be modified.

If national and/or local regulations exist in which some of the requirements could be more stringent than in this DEP, the Contractor shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements will be acceptable with regards to the safety, environmental, economic and legal aspects. In all cases the Contractor shall inform the Principal of any deviation from the requirements of this DEP which is considered to be necessary in order to comply with national and/or local regulations. The Principal may then negotiate with the Authorities concerned, the objective being to obtain agreement to follow this DEP as closely as possible.

1.3 DEFINITIONS

1.3.1 General definitions

The **Contractor** is the party that carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project or operation of a facility. The Principal may undertake all or part of the duties of the Contractor.

The **Manufacturer/Supplier** is the party that manufactures or supplies equipment and services to perform the duties specified by the Contractor.

The **Principal** is the party that initiates the project and ultimately pays for it. The Principal may also include an agent or consultant authorised to act for, and on behalf of, the Principal.

The word **shall** indicates a requirement.

The word **should** indicates a recommendation.

1.3.2 Abbreviations

Term	Definition
ADPCM	adaptive differential digital pulse code modulation
ADSL	asymmetric digital subscriber line
ARQ	automatic repeat request
ASYNC	asynchronous
ATM	asynchronous transfer mode
BER	bit error ratio
BPS	bits per second
CCIR	International Radio Consultative Committee
CELP	code enhanced linear predictive
CS-ACELP	conjugate structure algebraic CELP
DASS II	digital Access Signalling System No 2
DCE	data circuit-terminating equipment
DTE	data terminal equipment
DPNSS	digital private network signalling system
DSL	digital subscriber line
EIA	electronic Industries Association
EMC	electromagnetic compatibility
ESD	electrostatic discharge
FDDI	fibre distributed data interface

Term	Definition
FDM	frequency division multiplex
FM	frequency modulation
GAT	group audio terminal (audio conference system)
HDSL	high-bit-rate digital subscriber line
IDN	integrated digital network
IP	internet protocol
ISDN	Integrated Services Digital Network
ITU	International Telecommunication Union
ITU-R	International Telecommunication Union Radiocommunications division
ITU-T	International Telecommunication Union Telecommunications division
LAN	local area network
MTBF	mean time between failure
NDB	non directional beacon
NOTAM	notice containing aeronautical information to personnel concerned with flight operations
PABX	private automatic branch exchange
PAD	packet assembler/disassembler
PCM	pulse code modulation
PDH	plesiochronous digital hierarchy
PDS	premises distribution system
PTO	public telecommunication operator
SDH	synchronous digital hierarchy
SHDSL	symmetric high-speed digital subscriber line
SHF	super high frequency
SOLAS	Safety Of Life At Sea
TDM	time division multiplexing
TDMA	time division multiple access
UHF	ultra high frequency
VDL	very-high-bit-rate digital subscriber line
VHF	very high frequency
VSAT	very small aperture terminal
WARC	World Administrative Radio Conference

1.4 CROSS-REFERENCES

Where cross-references to other parts of this DEP are made, the referenced section number is shown in brackets (). Other documents referenced by this DEP are listed in (6).

1.5 SUMMARY OF MAIN CHANGES

This DEP is a revision of the DEP of the same number dated May 2004. The following are the main, non-editorial changes.

Section	Change
All	Replaced the description for ITU-T and ITU-R to follow latest description.
All	Removed the ITU-T and ITU-R recommendation which is not applicable to this DE.P
All	Include newer ITU-T and ITU-R recommendation to the DEP.
	Removed Transmission Media section as it is included in DEP 32.71.00.30-Gen. DEP.
2.2	Changed numbering due to previous Section 2.2 deletion. Included new introduction.
2.3	Changed numbering due to previous Section 2.2 deletion.
2.3.4	Add new section for Digital Subscriber Line.
2.4.1	Removed old ITU-T recommendation, which is not applicable to the DEP. Included newer recommendation.
	Removed Message Handling System section as it is not applicable to this DEP.
2.4	Changed numbering due to previous Section 2.2 and Section 2.5 deletion.
2.5	Changed numbering due to previous Section 2.2 and Section 2.5 deletion.

1.6 COMMENTS ON THIS DEP

Comments on this DEP may be submitted to the Administrator using one of the following options:

Shell DEPs Online (Users with access to Shell DEPs Online)	Enter the Shell DEPs Online system at https://www.shelldeps.com Select a DEP and then go to the details screen for that DEP. Click on the "Give feedback" link, fill in the online form and submit.
DEP Feedback System (Users with access to Shell Wide Web)	Enter comments directly in the DEP Feedback System which is accessible from the Technical Standards Portal http://www.shell.com/standards . Select "Submit DEP Feedback", fill in the online form and submit.
DEP Standard Form (Other users)	Use DEP Standard Form 00.00.05.80-Gen. to record feedback and email the form to the Administrator at standards@shell.com .

Feedback that has been registered in the DEP Feedback System by using one of the above options will be reviewed by the DEP Custodian for potential improvements to the DEP.

1.7 DUAL UNITS

This DEP contains both the International System (SI) units, as well as the corresponding US Customary (USC) units, which are given following the SI units in brackets. When agreed by the Principal, the indicated USC values/units may be used.

2. INTERNATIONAL STANDARDS FOR TELECOMMUNICATIONS

2.1 GENERAL CHARACTERISTICS OF CARRIERS

2.1.1 General

Privately operated networks have been set up throughout the world because PTOs are often unable to extend their services to remote locations. ITU-T recognises private networks and gives guidance on the general standards to follow when private networks are connected to the public networks.

Main ITU-T standards:

G.175	Transmission planning for private/public network interconnection of voice traffic
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2.1.2 Digital carriers

Digital technology has now effectively replaced analogue carrier systems, and the ITU-T standards applying to digital carriers cover either the 1544 kbps or 2048 kbps hierarchy, otherwise known as T1 or E1. The decision as to which hierarchy to follow will be influenced by the existing local public network hierarchy and the availability of equipment and installation/maintenance support.

Main ITU-T standards:

G.702	Digital hierarchy bit rates
G.703	Physical/electrical characteristics of hierarchical digital interfaces
G.704	Synchronous frame structures used at 1544, 2048, 6312, 8448 and 44,736 kbps hierarchical levels
G.732	Characteristics of primary PCM multiplex equipment operating at 2048 kbps
G.733	Characteristics of primary PCM multiplex equipment operating at 1544 kbps
G.741 to 747	Characteristics of second order multiplex equipment
G.751 to 755	Characteristics of higher order multiplex equipment.
G.803	Architecture of transport networks based on the Synchronous Digital Hierarchy (SDH)
G.804	ATM cell mapping into Plesiochronous Digital Hierarchy (PDH)

2.2 VOICE SERVICES

Voice Services provides audio conversation among two (2) parties or an audio conferencing for a group of people. Voice services have been moving from fixed to mobile and migrating towards IP base or VOIP. Although the interfacing method might be changed, ITU-T transmission quality and characteristic recommendation remain to provide acceptable voice/conversation quality standard which was suggested in (2.2.1) and (2.2.1).

Main ITU-T standards:

G.711	Pulse code modulation (PCM) of voice frequencies
H.323	Packet-based multimedia communications systems

H.323 defines the protocols to provide audio-visual communication sessions on any packet network and widely implemented by voice and videoconferencing equipment manufacturers for both voice and video services over IP networks.

2.2.1 Telephone transmission quality

Private voice networks should follow ITU-T recommendations regarding absolute and relative power (loudness) levels and transmission standards. Verification of transmission plans on incoming and outgoing levels should adopt ITU-T recommended measurements and weighting factors.

Main ITU-T standards:

P.11	Effect of transmission impairments
G.101	The (Voice) transmission plan.
G.101.1	The use of the decibel and of relative levels in speech-band telecomms.

Other standards applicable to voice over IP

P.800	Methods for subjective determination of transmission quality
P.862	Perceptual evaluation of speech quality (PESQ): An objective method for end-to-end speech quality assessment of narrow-band telephone networks and speech codecs

2.2.2 Interconnection of exchanges

Local PTO regulations shall be followed with regard to the interconnection of a private exchange to the public network. Often PTO regulations specify the use of a signalling system based on ITU-T standards.

For the interconnection of private exchanges, the network planner has a variety of options based on proprietary and de-facto standards. The decision to select a signalling system should take account of:

- a. Whether or not all exchanges in the network will be of the same family, i.e., the Supplier's. If the same family is used, a proprietary standard providing advanced service can be adopted.
- b. Whether various types of exchanges from various Manufacturers will be used. In this case either a de-facto standard, supported by all of the various Manufacturers, or a signalling system based on ITU-T standard can be used.

In most cases, PTOs will employ digital signalling systems; however, the use of analogue signalling systems may apply in a number of geographic locations.

Main ITU-T standards:

- a. Analogue type of signalling:
 - Q.3XX and Q.4XX Specifications of signalling systems R1 and R2
- b. Digital Common channel signalling:
 - Q.7XX Specifications of signalling system No. 7
 - Q.931 ISDN user-network interface layer 3 specification for basic call control
- c. Accepted standards developed and agreed among various vendors:
 - DPNSS No 2 Digital Private Network Signalling Standard
 - Q.Sig IPNS Forum specification for ISDN user to network call control
- d. De-facto standard based on ITU-T recommendations:
 - British Telecom
 - DASS II British standard for digital signalling

2.3 DATA SERVICES

2.3.1 Data services over analogue network

Modems interfacing with analogue fixed or switched circuits should follow ITU-T recommendations for the physical layer interface and signal levels in order to meet (local) PTO-type approval specifications. If applicable, ITU-T standards should be followed for the interface between modem and terminal.

V.44	Data compression procedures
V.90	A digital modem and analogue modem pair for use on the Public Switched Telephone Network (PSTN) at data signalling rates of up to 56 000 bit/s downstream and up to 33 600 bit/s upstream
V.92	Enhancements to Recommendation V.90

2.3.2 Data services over traditional packet switching networks

Private packet switching networks should follow ITU-T recommendations for public packet switching networks. Traditional packet switching networks are often referred to under the main interface recommendation "X.25". Although the usage are becoming less common, their details are listed here, as it is likely that it is still used in certain territories, and for particular applications.

Main ITU-T standards:

X.3	Packet Assembly Disassembly facility (PAD) in a public data network
X.21	(Public) data networks interface for Sync. terminals
X.21 bis	Use of V-series modems on (public) data networks
X.25	Interface between packet mode terminals and networks
X.28	Interface for Async terminals and (public) Packet Assembling/ Disassembling facilities (PADs)
X.29	Procedures for interchange of information between a PAD and a packet terminal or other PAD
X.30	Support of X.21, X.21 bis and X.20 bis terminals by an Integrated Services Digital Network (ISDN).

2.3.3 Data services over frame relay networks

Data services that utilise frame relays as a means of transmission are widely used, in both private and public switching networks, and shall follow ITU-T recommendations, as outlined below.

Main ITU-T standards:

X.33	Access to packet switched data transmission services via frame relay
X.36	Interface between DTE and DCE for frame relay public data networks
X.76	Network to network interface between public frame relay data transmission networks
Q.933	Signalling specifications for frame mode switched and permanent virtual connections

2.3.4 Digital Subscriber Line (DSL)

Digital subscriber line is a PTO service that provides internet access by transmitting digital data over the wires of a local telephone network. Bit rate of DSL services typically ranges from 256 kbit/s to 40 Mbit/s in the direction to the customer (downstream), depending on DSL technology, line conditions, and service-level implementation. DSL enables faster data

transmission over copper telephone lines than a conventional modem can provide. Follows will be the categories and standards for DSL.

Main ITU-T standards:

a. ADSL

ITU G.992.1	Asymmetric digital subscriber line (ADSL) transceivers
ITU G.992.2	Splitterless asymmetric digital subscriber line (ADSL) transceivers

b. ADSL2

ITU G.992.3	Asymmetric digital subscriber line transceivers 2 (ADSL2)
ITU G.992.4	Splitterless asymmetric digital subscriber line transceivers 2 (splitterless ADSL2)

c. ADSL2+

ITU G.992.5	Asymmetric digital subscriber line 2 transceivers (ADSL2)– Extended bandwidth ADSL2 (ADSL2plus)
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d. HDSL

ITU G.991.1	High bit rate digital subscriber line (HDSL) transceivers
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e. SHDSL

ITU G.991.2	Single-pair high-speed digital subscriber line (SHDSL) transceivers
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f. VDSL

ITU G.993.1	Very high speed digital subscriber line transceivers (VDSL)
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g. VDSL2

ITU G.993.2	Very high speed digital subscriber line transceivers 2 (VDSL2)
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2.4 ADDITIONAL SERVICES

2.4.1 Facsimile

Facsimile equipment is used to transmit/receive documents via the public switched telephone network. Because of the open nature of facsimile, ITU-T recommendations should be followed to allow communications to all parties. Group 3 equipment is recommended for general use on any analogue or digital network. Group 4 equipment operates via (public) 64 kbps ISDN lines often more economically, but with limited interconnectivity.

Main ITU-T standards:

T.4	Standardization of Group 3 facsimile terminals for document transmission
T.6	Facsimile coding schemes and coding control functions for Group 4 facsimile apparatus
T.22	Standardisation test charts for document facsimile transmission