

TÜRK TELEKOMÜNİKASYON A.Ş.

INTERFACE CRITERIONS

v1.0

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This document contains Interface criteria which are used in Türk Telekom.

Information about interface criteria are not a part of a contract that are signed between Türk Telekom and clients or operators

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I. R1 SIGNALLING

I.A. E&M (1 BIT) SIGNALLING

SIGNALS	FORWARD(af)	BACKWARD (ab)
Idle	0	0
Seizure	1	0
Seizure Acknowledgement	1	1
Start Dial	1	0
Answer	1	1
Clear Back	0/1	0
Clear Forward	0	0/1

I.A.1 Seizure signal should remain for 100 ms until it is defined as valid.

I.A.2 On 2-Way trunks' I/C part, if Seizure Acknowledgement is obtained before 95 ms, it is called as glare.

I.A.3 The time for Trunk to get in idle state is 1 sec after Clear Forward.

I.B. 2W DC LOOP (2 BIT) SIGNALLING
I.B.1. NORMAL

SIGNALS	Forward		Backward	
	af	bf	ab	bb
Idle	1	1	1	1
Seizure	0	1	1	1
Start Dial (Wink)	0	1	0 After 180 ms 1	1 1
Answer	0	1	0	1
Clear Forward (After CB)	1	1	1	1
Clear Forward (Before CB)	1	1	0	1
Clear Back (After CF)	1	1	1	1
Clear Back (Before CF)	0	1	1	1
Blocking	1	1	1	0
Junction Failure	1	1	1	0
Unequip. Chnl. Unit (I/C)	1	1	1	0
Unequip. Chnl. Unit (O/G)	1	0	1	1

I.B.1.1 The time for Wink signal to be accepted by O/G part as a valid signal, must be adjustable (between 100-160 ms) in case the I/C part is an X-Bar type exchange and there exists a delay on register connection time.

I.B.1.2 After CF, the time for Trunks to get in idle state is 1 sec.

II. CCS#7 STANDARTS

- Q.701** : Functional Description of the Signalling System - MTP (3/1993)
- Q.702** : Signalling Data Link (1988 , 1993)
- Q.703** : Signalling Link (7/96)
- Q.704** : Signalling Network Functions and Messages (7/96)
- Q.705** : Signalling Network Structure (3/93)
- Q.706** : Message Transfer Part Signalling Performance (3/93)
- Q.707** : TESTING AND MAINTENANCE (1988)
- Q.708** : Numbering of International Signalling Point Codes (3/93)
- Q.709** : Hypothetical Signalling Reference Connection (3/93)
- Q.711** : Functional Description of the Signalling Connection Control Part (07/96)
- Q.712** : Definition and Function of SCCP Messages (07/96)
- Q.713** : SCCP Formats and Codes (07/96)
- Q.714** : Signalling Connection Control Part Procedures (07/96)
- Q.716** : Signalling Connection Control Part (SCCP) Performances (03/93)
- REC Q.730** : (09/97) ISDN USER PART SUPPLEMENTARY SERVICES
- REC Q.731.3** : (03/93) STAGE 3 DESCRIPTION FOR NUMBER IDENTIFICATION SUPPLEMENTARY SERVICES USING SIGNALLING SYSTEM No. 7
- REC Q.731.7** : (06/97) STAGE 3 DESCRIPTION FOR NUMBER IDENTIFICATION SUPPLEMENTARY SERVICES USING SIGNALLING SYSTEM No. 7: MALICIOUS CALL IDENTIFICATION (MCID)

REC Q.731.8 : (02/92) STAGE 3 DESCRIPTION FOR NUMBER IDENTIFICATION SUPPLEMENTARY SERVICES USING SIGNALLING SYSTEM No. 7: SUB ADDRESSING (SUB)

REC Q.732.2 : (07/96) STAGE 3 DESCRIPTION FOR CALL OFFERING SUPPLEMENTARY SERVICES USING SIGNALLING SYSTEM No. 7: CALL DIVERSION SERVICES

REC Q.732.7 : (07/96) STAGE 3 DESCRIPTION FOR CALL OFFERING SUPPLEMENTARY SERVICES USING SIGNALLING SYSTEM No. 7:EXPLICIT CALL TRANSFER

REC Q.733.1 : (02/92) STAGE 3 DESCRIPTION FOR CALL COMPLETION SUPPLEMENTARY SERVICES USING SS No. 7:CALL WAITING

REC Q.733.2 : (03/93) STAGE 3 DESCRIPTION FOR CALL COMPLETION SUPPLEMENTARY SERVICES USING SS No. 7

REC Q.733.3 : (06/97) STAGE3 DESCRIPTION FOR CALL COMPLETION SUPPLEMENTARY SERVICES USING SIGNALLING SYSTEM No.7:COMPLETION OF CALLS TO BUSY SUBSCRIBER (CCBS)

REC Q.734.1 : (03/93) STAGE 3 DESCRIPTION FOR MULTIPARTY SUPPLEMENTARY SERVICES USING SS NO. 7Rec

REC Q.734.2 : (07/96) STAGE3 DESCRIPTION FOR MULTIPARTY SUPPLEMENTARY SERVICES USING SIGNALLING SYSTEM No.7:THREE-PARTY

REC Q.735.1 : (03/93) STAGE 3 DESCRIPTION FOR COMMUNITY OF INTEREST SUPPLEMENTARY SERVICES USING SS NO. 7R

REC Q.735.6 : (07/96) STAGE 3 DESCRIPTION FOR COMMUNITY OF INTEREST SUPPLEMENTARY SERVICES USING SIGNALLING SYSTEM NO. 7: GLOBAL VIRTUAL NETWORK SERVICE (GVNS)

REC Q.737.1 : (06/97) STAGE 3 DESCRIPTION FOR ADDITIONAL INFORMATION TRANSFER SUPPLEMENTARY SERVICES USING SIGNALLING SYSTEM NO. 7:USER-TO-USER SIGNALLING (UUS)

REC Q.761 : (09/97) SIGNALLING SYSTEM NO. 7– ISDN USER PART FUNCTIONAL DESCRIPTION

REC Q.762 : (09/97) SIGNALLING SYSTEM NO. 7– ISDN USER PART GENERAL FUNCTIONS OF MESSAGES AND SIGNALS

REC Q.763 : (09/97) SIGNALLING SYSTEM NO. 7– ISDN USER PART FORMATS AND CODES

REC Q.764 : (09/97) SIGNALLING SYSTEM No.7-ISDN USER PART SIGNALLING PROCEDURES

Q.766(B.B) : Performance Objectives in the ISDN Application (3/93)

Q.767 : Application of the ISDN User Part of CCS No.7 for International ISDN Interconnections (1991)

Q.767 ANNEX-A : Integrated Services Digital Network User Part (ISUP)

Q.767 ANNEX-B : General Function of Messages and Signals

Q.767 ANNEX C (Q.767) : Formats and codes

Q.767 ANNEX D (Q.764) : Signalling Procedures

Q.767 ANNEX E : Supplementary Services

Q.771 : Functional Description of Transaction Capabilities (06/97)

Q.772 : Transaction Capabilities Information Element Definitions (06/97)

Q.773 : Transaction Capabilities Formats and Encoding (06/97)

Q.774 : Transaction Capabilities Procedures (06/97)

Q.780 : TEST SPECIFICATIONS

Q.781 : MTP LEVEL 2 TEST SPECIFICATION (7/96)

Q.782 : MTP LEVEL 3 TEST SPECIFICATION (7/96)

Q.784 : (1991) ISUP TEST SPECIFICATION

Q.786 : SIGNALLING SYSTEM No.7 SCCP TEST SPECIFICATION (03/93)

Q.787 : Transaction capabilities (TC) TEST SPECIFICATION (09/97)

REC Q.788 : (06/97) USER-NETWORK-INTERFACE TO USER-NETWORK-INTERFACE COMPATIBILITY TEST SPECIFICATIONS FOR ISDN, NON-ISDN AND UNDETERMINED ACCESSES INTERWORKING OVER INTERNATIONAL ISUP

Q.791 : MONITORING AND MEASUREMENT

III. ISDN STANDARTS

III.1. FRAME OF I SERIES TERMINOLOGY

REC.I.112 : (03/93) VOCABULARY OF TERMS FOR ISDNs

REC.I.114 : (03/93) VOCABULARY OF TERMS FOR UPT

REC. I.120 : (03/93) INTEGRATED SERVICES DIGITAL NETWORKS (ISDNs)

REC I.122 : (03/93) FRAMEWORK FOR PROVIDING ADDITIONAL PACKET MODE BEARER SERVICES

REC.I.130 : (1988) METHOD FOR THE CHARACTERIZATION OF TELECOMMUNICATION SERVICES SUPPORTED BY AN ISDN AND NETWORK CAPABILITIES OF AN ISDN

REC.I.140 : (1993)ATTRIBUTE TECHNIQUE FOR THE CHARACTERIZATION OF TELECOMMUNICATION SERVICES SUPPORTED BY AN ISDN AND NETWORK CAPABILITIES OF AN ISDN

REC. I.141 : (1988) ISDN NETWORK CHARGING CAPABILITIES ATTRIBUTES

REC. I.200 : SERIES RECOMMENDATIONS SERVICE CAPABILITIES

REC. I.200 : (1988) GUIDANCE TO THE I.200-SERIES OF RECOMMENDATIONS

REC.I.210 : (03/93) PRINCIPLES OF TELECOMMUNICATION SERVICES SUPPORTED BY AN ISDN AND THE MEANS TO DESCRIBE THEM

REC. I.220 : (1988) COMMON DYNAMIC DESCRIPTION OF BASIC TELECOMMUNICATION SERVICES

REC. I.221 : (03/93) COMMON SPECIFIC CHARACTERISTICS OF SERVICES

REC. I.230 : (1988) DEFINITION OF BEARER SERVICE CATEGORIES

REC I.231 : CIRCUIT-MODE BEARER SERVICE CATEGORIES

REC. I.232 : PACKET-MODE BEARER SERVICES CATEGORIES

REC.I.233 : FRAME MODE BEARER SERVICES

REC.I.240 : (1988) DEFINITION OF TELESERVICES

REC. I.241 : TELESERVICES SUPPORTED BY AN ISDN

REC. I.250 : (1988) DEFINITION OF SUPPLEMENTARY SERVICES

REC.I.251 : NUMBER IDENTIFICATION SUPPLEMENTARY SERVICES

REC.I.252 : CALL OFFERING SUPPLEMENTARY SERVICES

REC. I. 253 : CALL COMPLETION SUPPLEMENTARY SERVICES

REC. I.254 : MULTIPARTY SUPPLEMENTARY SERVICES

REC. I.255 : COMMUNITY OF INTEREST SUPPLEMENTARY SERVICES

REC. I.256 : (1988) CHARGING SUPPLEMENTARY SERVICES

REC. I.257 : ADDITIONAL INFORMATION TRANSFER

REC.I.258 :

REC. I.258.2 : (02/95) IN-CALL MODIFICATION

REC.I.259.1 : ADDRESS SCREENING(ADS) (07/96)

III.2. I.300 SERIES RECOMMENDATIONS-OVERALL NETWORK ASPECTS AND FUNCTIONS

REC.I.310 : ISDN NETWORK FUNCTIONAL PRINCIPLES(03/93)

REC.I.312/Q1201 : PRINCIPLES OF IN ARCHITECTURE(10/92)

REC.I.320 : ISDN PROTOCOL REFERENCE MODEL(11/93)

REC.I.324 : ISDN NETWORK ARCHITECTURE(10/91)

REC.I.325 : REFERENCE CONFIGURATIONS FOR ISDN CONNECTION TYPES(03/93)

REC.I.328 /Q1202 : IN-SERVICE PLANE ARCHITECTURE(09/97)

REC.I.329/Q1203 : IN-GLOBAL FUNCTIONAL PLANE ARCHITECTURE (09/97)

REC.I.330 : ISDN NUMBERING AND ADDRESSING PRINCIPLES(1988)

REC.I.331/E164 : THE INTERNATIONAL PUBLIC TELECOMMUNICATION NUMBERING PLAN(05/97)

REC.I.333 : TERMINAL SELECTION in ISDN(03/1993)

REC.I.334 : PRINCIPLES RELATING ISDN NUMBERS/SUBADDRESSES TO THE OSI REFERENCE MODEL NETWORK LAYER ADDRESSES(1988)

REC.I.340 : ISDN CONNECTION TYPES(1988)

REC.I.350 :GENERAL ASPECTS OF QUALITY OF SERVICE AND NETWORK PERFORMANCE IN DIGITAL NETWORKS, INCLUDING ISDNs(03/93)

REC.I.351 : RELATIONSHIPS AMONG ISDN PERFORMANCE RECOMMENDATIONS (06/97)

REC.I.352 : NETWORK PERFORMANCE OBJECTIVES FOR CONNECTION PROCESSING DELAYS IN AN ISDN(03/93)

REC.I.354 : NETWORK PERFORMANCE OBJECTIVES FOR PACKET MODE COMMUNICATION IN AN ISDN(03/93)

REC.I.355 : ISDN 64 kbit/s CONNECTION TYPE AVAILABILITY PERFORMANCE(03/95)



REC.I.370 : CONGESTION MANAGEMENT FOR THE ISDN FRAME RELAYING BEARER SERVICE(10/91)

REC.I.372 : FRAME RELAYING BEARER SERVICE NETWORK-TO-NETWORK INTERFACE REQUIREMENTS(03/93)

REC.I.373 : NETWORK CAPABILITIES TO SUPPORT UPT(03/93)

REC.I.375.1 : NETWORK CAPABILITIES TO SUPPORT MULTIMEDIA(06/98)

REC.I.376 : ISDN NETWORK CAPABILITIES FOR THE SUPPORT OF THE TELEACTION SERVICE(03/95)

III.3. I400 SERIES RECOMMENDATIONS-ISDN USER-NETWORK INTERFACES

REC.I.410 : GENERAL ASPECTS AND PRINCIPLES RELATING TO RECOMMENDATIONS ON ISDN USER-NETWORK INTERFACES(1988)

REC.I.411 : ISDN USER-NETWORK INTERFACES-REFERENCES CONFIGURATIONS (03/93)

REC.I.412 : ISDN USER-NETWORK INTERFACES-INTERFACE STRUCTURES AND ACCESS CAPABILITIES (1988)

REC.I.420 : BASIC USER-NETWORK INTERFACE(1988)

REC.I.421 : PRIMARY RATE USER-NETWORK INTERFACE(1988)

REC.I.430 : BASIC USER-NETWORK INTERFACE-LAYER1 SPEC.(11/95)

REC.I.431 : PRIMARY RATE USER-NETWORK INTERFACE-LAYER1 SPECIFICATION (03/93)

REC.I.440 : ISDN USERNETWORK..(1988)

REC.I.441 : ISDN USERNETWORK...(1988)

REC.I.450 : ISDN USERNETWORK...(1988)

REC.I.451 : ISDN USERNETWORK...(1988)

REC.I.452 : GENERIC PROCEDURES...(1988)

REC.I.460 : MULTIPLEXING, RATE ADAPTION AND SUPPORT OF EXISTING INTERFACES(1988)

REC.I.461 : SUPPORT OF X.21...(1988)

REC.I.462 : SUPPORT OF PACKET MODE...(1988)

REC.I.463 : SUPPORT OF DATA...(1988)

REC.I.464 : MULTIPLEXING, RATE ADAPTION AND SUPPORT OF EXISTING INTERFACES FOR RESTRICTED 64kbit/s TRANSFER CAPABILITY(10/91)

REC.I.465 : SUPPORT BY AN ISDN..(1988)

REC.I.470 : RELATIONSHIP OF TERMINAL FUNCTIONS TO ISDN(1988)

REC.I.500 : GENERAL STRUCTURE OF THE ISDN INTERWORKING RECOMMENDATIONS(03/93)

REC.I.501 : SERVICE INTERWORKING(03/93)

REC.I.510 : DEFINITIONS AND GENERAL PRINCIPLES FOR ISDN INTERWORKING(03/93)

REC.I.511 : ISDN-TO-ISDN LAYER 1 INTERNETWORK INTERFACE(1988)

REC.I.515 : PARAMETER EXCHANGE FOR ISDN INTERWORKING (03/93)

REC.I.520 : GENERAL ARRANGEMENTS FOR NETWORK INTERWORKING BETWEEN ISDNs(03/93)

REC.I.530 : NETWORK INTERWORKING BETWEEN ANISDN AND A PSTN(03/93)

REC.I.540 : GENERAL ARRANGEMENTS FOR INTERWORKING(1988)

REC.I.550 : GENERAL ARRANGEMENTS PSPDN ISDN(1988)

REC.I.555 : FRAME RELAYING BEARER SERVICE INTERWORKING(09/97)

REC.I.560 : REQUIREMENTS...(1988)

REC.I.570 : PUBLIC/PRIVATE ISDN INTERWORKING(03/93)

REC.I.571 : CONNECTION OF VSAT BASED PRIVATE NETWORKS TO THE PUBLIC ISDN(08/96)

REC.I.601 : GENERAL MAINTENANCE PRINCIPLES OF ISDN SUBSCRIBER ACCESS AND SUBSCRIBER INSTALLATION (1988)

REC.I.620 : FRAME RELAY OPERATION AND MAINTENANCE PRINCIPLES AND FUNCTIONS (10/96)

ITU-T Q.850 : USAGE OF CAUSE AND LOCATION IN THE DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1 AND THE SIGNALLING SYSTEM No.7 ISUP

ITU-T Q.920 : DIGITAL SUBSCRIBER SIGNALLING SYSTEM NO. 1 (DSS1) ISDN USER-NETWORK INTERFACE DATA LINK LAYER – GENERAL ASPECTS

ITU-T Q.921 : ISDN user-network interface – Data link layer specification

ITU-T Q.921 : for Primary Rate (Network-side)

ITU-T Q.921 bis : ABSTRACT TEST SUITE FOR LAPD CONFORMANCE TESTING

ITU-I Q.930 : DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1 (DSS 1) – ISDN USER-NETWORK INTERFACE LAYER 3 – GENERAL ASPECTS

ITU-T Q.930 bis : PICS AND ABSTRACT TEST SUITE FOR ISDN DSS 1 LAYER 3 – CIRCUIT MODE, BASIC CALL CONTROL CONFORMANCE TESTING

ITU-T Q.931 : (03/93) Digital Subscriber Signalling System No.1 (DSS1) - ISDN User-Network Interface Layer-3 Specification For Basic Call Control

ITU-T Q.931 bis : (02/95) PICS AND ABSTRACT TEST SUITE FOR ISDN DSS 1 LAYER 3 –CIRCUIT MODE, BASIC CALL CONTROL CONFORMANCE TESTING

ITU-T Q.932 : DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1 (DSS 1)– GENERIC PROCEDURES FOR THE CONTROL OF ISDN SUPPLEMENTARY SERVICES

ITU-T Q.933 : INTEGRATED SERVICES DIGITAL NETWORK (ISDN) DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1 (DSS 1) – SIGNALLING SPECIFICATIONS FOR FRAME MODE SWITCHED AND PERMANENT VIRTUAL CONNECTION CONTROL AND STATUS MONITORING

ITU-T Q.939 : DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1 (DSS 1) – TYPICAL DSS 1 SERVICE INDICATOR CODINGS FOR ISDN TELECOMMUNICATIONS SERVICES

ITU-T Q.940 : ISDN USER - NETWORK INTERFACE PROTOCOL FOR MANAGEMENT - GENERAL ASPECTS

ITU-T Q.941 : DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1 (DSS 1) – ISDN USER-NETWORK INTERFACE PROTOCOL PROFILE FOR MANAGEMENT

ITU-T Q.950 : SUPPLEMENTARY SERVICES PROTOCOLS, STRUCTURE AND GENERAL PRINCIPLES

ITU-T Q.951 :STAGE 3 DESCRIPTION FOR NUMBER IDENTIFICATION SUPPLEMENTARY SERVICES USING DSS 1

ITU-T Q.951.3 : STAGE 3 DESCRIPTION FOR NUMBER IDENTIFICATION SUPPLEMENTARY SERVICES USING DSS 1

ITU-T Q.951.7: STAGE 3 DESCRIPTION FOR NUMBER IDENTIFICATION SUPPLEMENTARY SERVICES USING DSS 1: MALICIOUS CALL IDENTIFICATION (MCID)

ITU-T Q.952 : STAGE 3 SERVICE DESCRIPTION FOR CALL OFFERING SUPPLEMENTARY SERVICES USING DSS 1 – DIVERSION SUPPLEMENTARY SERVICES

ITU-T Q.952.7 : STAGE 3 DESCRIPTION FOR CALL OFFERING SUPPLEMENTARY SERVICES USING DSS 1: EXPLICIT CALL TRANSFER (ECT)

ITU-T Q.953 : STAGE 3 DESCRIPTION FOR CALL COMPLETION SUPPLEMENTARY SERVICES USING DSS 1, SECTION 1 – CALL WAITING

ITU-T Q.953.2 : STAGE 3 DESCRIPTION FOR CALL COMPLETION SUPPLEMENTARY SERVICES USING DSS 1 CLAUSE 2: CALL HOLD

ITU-T Q.953.3 : STAGE 3 DESCRIPTION FOR CALL COMPLETION SUPPLEMENTARY SERVICES USING DSS 1: COMPLETION OF CALLS TO BUSY SUBSCRIBERS (CCBS)

ITU-T Q.953.4 : INTEGRATED SERVICES DIGITAL NETWORK (ISDN) – STAGE 3 DESCRIPTION FOR CALL COMPLETION SUPPLEMENTARY SERVICES USING DSS 1

ITU-T Q.954 : STAGE 3 DESCRIPTION FOR MULTIPARTY SUPPLEMENTARY SERVICES USING DSS 1
CLAUSE 1 – CONFERENCE CALLING
CLAUSE 2 – THREE-PARTY SERVICE

ITU-T Q.954.2 : INTEGRATED SERVICES DIGITAL NETWORK (ISDN) – STAGE 3 DESCRIPTION FOR MULTIPARTY SUPPLEMENTARY SERVICES USING DSS 1

ITU-T Q.955 : STAGE 3 DESCRIPTION FOR COMMUNITY OF INTEREST SUPPLEMENTARY SERVICES USING DSS 1
SECTION 1 – CLOSED USER GROUP

ITU-T Q.955.3 : STAGE 3 DESCRIPTION FOR COMMUNITY OF INTEREST SUPPLEMENTARY SERVICES USING DSS 1 CLAUSE 3 – MULTI-LEVEL

ITU-T Q.956 : INTEGRATED SERVICES DIGITAL NETWORK (ISDN) – STAGE 3 DESCRIPTION FOR CHARGING SUPPLEMENTARY SERVICES USING DSS 1 CLAUSE 3 – REVERSE CHARGING

ITU-T Q.956c.2 : INTEGRATED SERVICES DIGITAL NETWORK (ISDN) – STAGE 3 SERVICE DESCRIPTION FOR CHARGING SUPPLEMENTARY SERVICES USING DSS 1 CLAUSE 2 – ADVICE OF CHARGE (AOC)

ITU-T Q.957 : STAGE 3 DESCRIPTION FOR ADDITIONAL INFORMATION TRANSFER SUPPLEMENTARY SERVICES USING DSS 1: USER-TO-USER SIGNALLING (UUS)

IV. CLIP-CLIR STANDARTS

- ETS 300 659 - 1
- ETS 300 659 - 2
- ETS 300 648
- ETS 300 649

V. CONNECTION TO ACCESS NETWORK SYSTEMS

1. The exchange should support the connection to Access Networks(AN). ETSI's recent recommendations about V5.X should be matched. There will be no restrictions from the exchange side, about the subscriber side properties and services in case of connection. Standarts of V5.1(ETS 300, 324 1-9), V5.2 (ETS 300, 347 1-9) should be applied.
2. The connection to the exchange will be externally over ETSI V5.1 interface protocol.Connection to the AN systems will be over standart 2 Mbit/s (G.703) physical connection and with this, Analog subscriber, ISDN BRA services will be provided.
3. The connection to the exchange will be over ETSI V5.2 interface protocol externally. Connection to the AN systems will be over standart 2 Mbit/s (G.703) physical connection and with this, Analog subscriber, ISDN BRA , ISDN PRA services will be provided. The link number will be increased by the exchange automatically according to the traffic rate value per subscriber

VI. POINT TO POINT RADIO LINKS

Frequency range	Channel plan	Bit rate (Mbit/s)	Transmitter output power (dBm)	Reference standarts assumed to be fulfilled in frequency planning and defining the equipment type	Additional information
1.7-2.3 GHz					<i>New system installment is not done in this band, systems already working will be out of service after they have completed their economical life.</i>
1700-1900 MHz (lower band) and 1900-2100 MHz (mid-band)	ITU-R Rec.283	34	27	All related latest ITU-R, ITU-T and ETSI standarts	
3.8-4.2 GHz					<i>Installment of long haul SDH radio links is planned in this band.</i>
	ITU-R Rec.635	140	30	All related latest ITU-R, ITU-T and ETSI standarts	
5.9-6.4 Ghz					<i>Installment of long haul SDH radio links is planned in this band.</i>
	ITU-R Rec.384	140	30	All related latest ITU-R, ITU-T and ETSI standarts	
6.4-7.1 GHz					<i>Whole band allocated for the use of Turk Telekom. Installment of long haul SDH radio links is planned in this band.</i>
	ITU-R Rec.385-6	4x2	21/24	All related latest ITU-R, ITU-T and ETSI standarts	Output power 21 dBm for Ericsson, 24 dBm for Alcatel mini links
	ITU-R Rec.385-6	8x2	21/24	All related latest ITU-R, ITU-T and ETSI standarts	Output power 21 dBm for Ericsson, 24 dBm for Alcatel mini links
	ITU-R Rec.385-6	16x2	21/24	All related latest ITU-R, ITU-T and ETSI standarts	Output power 21 dBm for Ericsson, 24 dBm for Alcatel mini links
	ITU-R	155	25	All related latest ITU-R, ITU-T	

	Rec.385-6			and ETSI standarts	
10.4-10.66 GHz					
	CCIR Rec.607-3	4x2	20	All related latest ITU-R, ITU-T and ETSI standarts	
	ITU-R Rec. 747	4x2	20	All related latest ITU-R, ITU-T and ETSI standarts	
	ITU-R Rec. 747	8x2	20	All related latest ITU-R, ITU-T and ETSI standarts	
	ITU-R Rec. 747	16x2	20	All related latest ITU-R, ITU-T and ETSI standarts	
10.7-11.7 GHz					<i>This band is used in coordination with satellite systems.</i>
	ITU-R Rec. 387	140	30	All related latest ITU-R, ITU-T and ETSI standarts	
17.7-19.7 GHz					<i>Whole band allocated for the use of Turk Telekom</i>
	ITU-R Rec.595	4x2	17/18	All related latest ITU-R, ITU-T and ETSI standarts	Output power 17 dBm for Alcatel and Ericsson, 18 dBm for Siemens minilinks
	ITU-R Rec.595	8x2	17/18	All related latest ITU-R, ITU-T and ETSI standarts	Output power 17 dBm for Alcatel and Ericsson, 18 dBm for Siemens minilinks
	ITU-R Rec.595	16x2	17/18	All related latest ITU-R, ITU-T and ETSI standarts	Output power 17 dBm for Alcatel and Ericsson, 18 dBm for Siemens minilinks
	ITU-R Rec.595	155	18	All related latest ITU-R, ITU-T and ETSI standarts	
Frequency range	Channel plan	Bit rate (Mbit/s)	Transmitter output power (dBm)	Reference standarts assumed to be fulfilled in frequency planning and defining the equipment type	Additional information
22-23.6 GHz					<i>This band is used in coordination with satellite systems.</i>

	ITU-R Rec.637	4x2	19	All related latest ITU-R, ITU-T and ETSI standarts	
	ITU-R Rec.637	8x2	19	All related latest ITU-R, ITU-T and ETSI standarts	
	ITU-R Rec.637	16x2	19	All related latest ITU-R, ITU-T and ETSI standarts	
	CEPT Rec. T/R 13-02	4x2	19	All related latest ITU-R, ITU-T and ETSI standarts	
	CEPT Rec. T/R 13-02	8x2	19	All related latest ITU-R, ITU-T and ETSI standarts	
	CEPT Rec. T/R 13-02	16x2	19	All related latest ITU-R, ITU-T and ETSI standarts	

VII. POINT TO MULTIPOINT SYSTEMS (WIRELESS LOCAL LOOP)

Nr.	Parameter	Description	Comments
1	Frequency band	3425.28 - 3441.56 / 3475.96 - 3492.24 MHz	CEPT/ERC/REC 14-03 E
2	Radio service	fixed radio access	
3	Application	point to multipoint	
4	Channel spacing	307.2 kHz	
5	Modulation	$\pi/4$ DQPSK	
6	RF power	+29 dBm	base station site
7	Channel access method	FDMA/TDMA/FDD	
8	Electrical safety	-	EEC 73/23, IEC 950
9	EMC	-	EEC 89/336, ETS 300 339, ETS 300 386

Nr.	Parameter	Description	Comments
1	Frequency band	1890-1920 MHz	
2	Radio service	fixed radio access	
3	Application	point to multipoint	
4	Channel spacing	1 Mhz	
5	Modulation	3 level synthesized response FSK	
6	RF power	+26 dBm	base station site
7	Channel access method	Spread spectrum frequency hopping CDMA/TDMA/TDD	
8	Electrical safety	-	IEC 60950, UL 1950
9	EMC	-	

Nr.	Parameter	Description	Comments
1	Frequency band	1902.528-1918.080 MHz (point to multipoint part), 3411.75-3495.75 / 3511.75-3595.75 MHz (integrated TDM/TDMA radio transport part)	ETS 300 175
2	Radio service	fixed radio access	
3	Application	point to multipoint	
4	Channel spacing	1 Mhz (point to multipoint part), 3.5 MHz (integrated TDM/TDMA radio transport part)	
5	Modulation	0.5 GFSK	
6	RF power	+22 dBm	base station site
7	Channel access method	MC/TDMA/TDD	
8	Electrical safety	-	EN 60 950, EN 41 03, EN 60 215
9	EMC	-	EN 50 081, EN 50 082, prETS 300 385, ETS 300 339, ETS 300 329

VIII. Transmission Interface Specifications

Analog Interface Specifications

Frequency	Type	Empedance	ITU-T Rec.
0-400 kHz	2-Wire	600 Ohm	M.1040
0-400 kHz	4-Wire	600 Ohm	M.1040

Digital Interface Specifications

Rate	Type	Empedance	ITU-T Rec.
64 kb/s	Electrical	120 Ohm	G.703
2048 kb/s	Electrical	120 Ohm	G.703
8448 kb/s	Electrical	75 Ohm	G.703
34368 kb/s	Electrical	75 Ohm	G.703
139264 kb/s	Electrical	75 Ohm	G.703
155 Mb/s	Electrical	75 Ohm	G.703
155 Mb/s	Optical		G.957

IX. ATM BACKBONE (TURPAK and TTNET) Systems:

Access Centrals ;

- X.21 (12 Kbps to 64 Kbps),
- V.24 (RS-232-C) (1-2 Kbps to 19.2 Kbps),
- V.35 (1-2 Kbps to 128 Kbps),
- E1, E1c, channelized / unchannelized G.704 (64 Kbps to 2048 Kbps (2 Mbps)) (Balanced 120 Ohm),
- E3 (34 Mbps) unchannelized (BNC Coaxiel 75 Ohm)
- STM-1 (155 Mbps) channelized (Optic Single Mode – OC – 3 SM)
- STM-4 (622 Mbps) channelized (Optic Single Mode – OC –12 SM) **must support the interfaces.**

IX.1- X.25, ITI, SNA, X.75 (International) Services

The devices that access to the network are called DTE (Data Terminal Equipment) , network side or network central is called DCE (Data Circuit Terminating Equipment). X.25, ITI, SNA are standart protocols between DTE and DCE. X.75 is a protocol that is used for international connections.

IX.2- Frame Relay Services

Access switches must be convenient to the following standards.

Access switches must be convenient to the standards of International Telecommunication Union (ITU) and Frame Relay Forum Application Specification.

Access switches must support Frame Relay Forum (FRF.1) User-Network Application Interface (UNI),

Access switches must support Frame Relay Forum (FRF.1) Network-Network Application Interface (NNI),

Access switches must support Frame Relay PVC and SVC (compatible to FRF.4 – ITU-T Q.933 and Q.922) services.

Access switches must support Frame Relay –ATM union (FRF.5 & FRF.8) to transit easily ATM technology.

IX.3- ATM Services

Access switches must be convenient to the following standards

ATM Forum IISP and PNNI 1.0 Specification ATM UNI 3.0, UNI 3.1 and UNI 4.0 AAL1, AAL2 and AAL5 ITU-T FRF.5 and FRF.8 TM 4.0

Provided services are reasonable for the following ITU standards.

ITU – T : (International Telecommunications Union)

G : General aspects of digital transmission systems.

V : Data communication over the telephone network.

X : Other data communication matters.

Recommendation G.704: SYNCHRONOUS FRAME STRUCTURES USED AT PRIMARY AND SECONDARY HIERARCHICAL LEVELS.

Recommendation V.24: LIST OF DEFINITIONS FOR INTERCHANGE CIRCUITS BETWEEN DATA TERMINAL EQUIPMENT (DTE) AND DATA COMMUNICATION EQUIPMENT (DCE).

Recommendation V.35: DATA TRANSMISSION AT 48 KBIT/S USING 60-108 KHZ GROUP BAND CIRCUITS.

Recommendation X.21: INTERFACE BETWEEN DATA TERMINAL EQUIPMENT (DTE) AND DATA CIRCUIT-TERMINATING EQUIPMENT (DCE) FOR SYNCHRONOUS OPERATION ON PUBLIC DATA NETWORKS.

Recommendation X.25: INTERFACE BETWEEN DATA TERMINAL EQUIPMENT (DTE) AND DATA CIRCUIT-TERMINATING EQUIPMENT (DCE) FOR TERMINALS

OPERATING IN THE PACKET MODE AND CONNECTED TO PUBLIC DATA NETWORKS BY DEDICATED CIRCUIT.

Recommendation FRAME RELAY

- **Passport Frame Relay—Key Technical Specifications**
 - V.35
 - V.11
 - E1 CHANNELIZED AND UNCHANNELIZED HSSI (HIGH-SPEED SERIAL INTERFACE)

- **Passport Frame Relay Specifications**
 - STANDARDS-COMPLIANT UNI AND NNI (ITU-T, ANSI, FRAME RELAY AND VENDOR FORUM) SELECTABLE CLOSED LOOP CONGESTION AVOIDANCE AND CONTROL SELECTABLE RATE ENFORCEMENT AND/OR ADAPTATION (POLICING WITH SEVERAL ALGORITHMS)
 - HIGH-DENSITY, HIGH-SPEED INTERFACES (UP TO 50 MBPS)
 - DIFFERENTIATED TRAFFIC CLASS MANAGEMENT (SELECTABLE TRANSFER AND DISCARD PRIORITIES)
 - FRAME RELAY USAGE-BASED ACCOUNTING AND DETAILED STATISTICS
 - SUPPORT OF X.121 AND E.164 ADDRESSING SCHEMES
 - PERMANENT AND SWITCHED VIRTUAL CIRCUITS (PVCS AND SVCS)
 - SIGNALLED PER DLCI AND PORT CLOSED USER GROUPS (CUG)
 - PVC RESILIENCY (UNI AND NNI)
 - SVC CALL REDIRECTION AND HUNTGROUPTS
 - FR-ATM INTERWORKING (SERVICE AND NETWORK INTERWORKING)

- **ITU-T Compliance For Frame Relay Service**
 - I.233.1-FRAME RELAY BEARER SERVICES
 - I.370-CONGESTION MANAGEMENT IN FRAME RELAY NETWORKS
 - Q.933-DSS1 SIGNALING SPECIFICATION FOR FRAME MODE BEARER SERVICE
 - Q.933-ANNEX A ADDITIONAL PROCEDURES FOR PVCS USING UNNUMBERED INFORMATION FRAMES
 - Q.922-ANNEX A CORE ASPECTS OF Q.922 FOR USE WITH FRAME RELAYING BEARER SERVICE
 - I.122-FRAME RELAY FRAMEWORK
 - I.555-FRAME RELAY BEARER SERVICE INTERWORKING

- **Recommendation ATM**
 - E3 (34 Mbps) UNCHANNELIZED
 - STM-1 (155 Mbps) CHANNELIZED

X. TDM SYSTEMS:

X.1. Leased Line Service

Devices accessing to TDM Network suitability with devices which is used at the network and operating from Türk Telekom is obligated because of technical reasons.

Devices accessing Türk Telekom TDM systems must be suitable with following ITU standards.

ITU-T (International Telecommunications Union)

G : General aspects of digital transmission systems.

V : Data communication over the telephone network.

X : Other data communication matters.

Recommendation G.703: PHYSICAL / ELECTRICAL CHARACTERISTICS OF HIERARCHICAL DIGITAL INTERFACES.

Recommendation G.704: SYNCHRONOUS FRAME STRUCTURES USED AT PRIMARY AND SECONDARY HIERARCHICAL LEVELS.

Recommendation G.706: FRAME ALIGNMENT AND CYCLIC REDUNDANCY CHECK (CRC) PROCEDURES RELATING TO BASIC FRAME STRUCTURES DEFINED.

Recommendation V.24: LIST OF DEFINITIONS FOR INTERCHANGE CIRCUITS BETWEEN DATA TERMINAL EQUIPMENT (DTE) AND DATA CIRCUIT-TERMINATING EQUIPMENT (DCE).

Recommendation V.35: DATA TRANSMISSION AT 48 KBIT/S USING 60-108 KHZ GROUP BAND CIRCUITS.

Recommendation V.36: MODEMS FOR SYNCHRONOUS DATA TRANSMISSION USING 60-108 KHZ GROUP BAND CIRCUITS.

Recommendation X.21: INTERFACE BETWEEN DATA TERMINAL EQUIPMENT (DTE) AND DATA CIRCUIT-TERMINATING EQUIPMENT (DCE) FOR SYNCHRONOUS OPERATION ON PUBLIC DATA NETWORKS.

XI. SUPPORTED PROTOCOLS IN IP NETWORKS :

XI.1. ATM

- RFC 1483, Multiprotocol Encapsulation over ATM Adaptation Layer 5 (routed Protocol Data Units only)
- RFC 2225, Classical IP and ARP over ATM (responses only)
- RFC 2684, Multiprotocol Encapsulation over ATM Adaptation Layer 5 (routed Protocol Data Units and Ethernet bridged protocol data units only)

XI.2. SDH ve SONET

- ANSI T1.105, Synchronous Optical Network (SONET) Basic Description Including Multiplex Structures, Rates, and Formats
- ANSI T1.105.02, Synchronous Optical Network (SONET) Payload Mappings
- ANSI 1.105.06, SONET: Physical Layer Specifications
- GR-23-CORE, SONET Transport Systems: Common Generic Criteria
- GR-499-CORE, Transport System Generic Requirements (TSGR): Common Requirements
- GR-1377-CORE, SONET OC-192 Transport System Generic Criteria
- ITU-T Recommendation G.691, Optical interfaces for single channel SDH systems with optical amplifiers, and STM-64 systems
- ITU-T Recommendation G.707 (1996), Network node interface for the synchronous digital hierarchy (SDH)
- ITU-T Recommendation G.783 (1994), Characteristics of Synchronous Digital Hierarchy (SDH) equipment functional blocks
- ITU-T Recommendation G.813 (1996), Timing characteristics of SDH equipment slave clocks (SEC)
- ITU-T Recommendation G.825 (1993), The control of jitter and wander within digital networks which are based on the Synchronous Digital Hierarchy (SDH)
- ITU-T Recommendation G.826 (1999), Error performance parameters and objectives for international, constant bit rate digital paths at or above the primary rate
- ITU-T Recommendation G.831 (1993), Management capabilities of transport networks based on Synchronous Digital Hierarchy (SDH)
- ITU-T Recommendation G.957 (1995), Optical interfaces for equipment and systems relating to the synchronous digital hierarchy
- ITU-T Recommendation G.958 (1994), Digital line systems based on the Synchronous Digital Hierarchy for use on optical fibre cables

XI.3-BGP

- RFC 1771, A Border Gateway Protocol 4 (BGP-4)
- RFC 1772, Application of the Border Gateway Protocol in the Internet
- RFC 1966, BGP Route Reflection—An Alternative to Full-Mesh IBGP
- RFC 1997, BGP Communities Attribute

- RFC 2270, Using a Dedicated AS for Sites Homed to a Single Provider
- RFC 2283, Multiprotocol Extensions for BGP-4
- RFC 2385, Protection of BGP Sessions via the TCP MD5 Signature Option
- RFC 2439, BGP Route Flap Damping
- RFC 2858, Multiprotocol Extensions for BGP-4
- RInternet draft draft-ietf-idr-cap-neg-01, Capabilities Negotiation with BGP4
- Internet draft draft-ietf-idr-restart-06.txt, Graceful Restart Mechanism for BGP
- FC 3065, Autonomous System Confederations for BGP

XI.4-Frame Relay

- RFC 1490, Multiprotocol Interconnect over Frame Relay
- ANSI T1.617-1991, AnnexD, Additional procedures for permanent virtual connections (PVCs) using unnumbered information frames
- FRF.15, End-to-End Multilink Frame Relay Implementation Agreement
- FRF.16.1, Multilink Frame Relay UNI/NNI Implementation Agreement
- ITU Q.933a, Annex A, Additional Procedures for Permanent Virtual Connections (PVC) status management (using Unnumbered Information frames)

XI.5-PPP

- RFC 1332, The PPP Internet Protocol Control Protocol (IPCP)
- RFC 1661, The Point-to-Point Protocol (PPP)
- RFC 1662, PPP in HDLC-like Framing
- RFC 1990, The PPP Multilink Protocol (MP)
- RFC 2615, PPP over SONET/SDH

XI.6-TCP/IP v4

- RFC 768, User Datagram Protocol
- RFC 791, Internet Protocol
- RFC 792, Internet Control Message Protocol
- RFC 793, Transmission Control Protocol
- RFC 826, Ethernet Address Resolution Protocol
- RFC 854, Telnet Protocol Specification
- RFC 862, Echo Protocol
- RFC 863, Discard Protocol
- RFC 896, Congestion Control in IP/TCP Internetworks
- RFC 919, Broadcasting Internet Datagrams
- RFC 922, Broadcasting Internet Datagrams in the Presence of Subnets
- RFC 959, File Transfer Protocol
- RFC 1027, Using ARP to Implement Transparent Subnet Gateways
- RFC 1042, Standard for the Transmission of IP Datagrams over IEEE 802 Networks
- RFC 1157, Simple Network Management Protocol (SNMP)
- RFC 1166, Internet Numbers
- RFC 1195, Use of OSI IS-IS for Routing in TCP/IP and Dual Environments

- RFC 1256, ICMP Router Discovery Messages
- RFC 1305, Network Time Protocol (Version 3) Specification, Implementation, and Analysis
- RFC 1519, Classless Inter-Domain Routing (CIDR): An Address Assignment and Aggregation Strategy
- RFC 1812, Requirements for IP Version 4 Routers
- RFC 1948, Defending Against Sequence Number Attacks
- RFC 2338, Virtual Router Redundancy Protocol
- RFC 3246, An Expedited Forwarding PHB (Per-Hop Behavior)

XII. SUPPORTED PROTOCOLS IN RAS

XII.1- RAS/MODEM

V.90, V.92, V.21,V.23,V.22, V.22bis, V.32, V.32bis, V.34, V.34bis, V.110, V.120, K56, V.25, V.42, X2 Modem Protocols

XII.2. Radius Server

RFC2618, RFC2619, RFGC2620, RFC2621, RFC2609, RFC2665, RFC2666, RFC2667, RFC2668, RFC2669, RFC2882

Dial-up connections:

Analog PPP

ISDN PPP

Multilink PPP

Multichassis Multilink PPP

XII.3. VPOP

L2TP, VPN tunnelling protocol

IPSEC protocol

XII.4. SS7 Signalling Gateway

ISUP

SS7 Signalling protocol

Protocols between Signalling Gateway and RAS

Q.931

IPDC

MGCP

SLAP

XII.5. WLAN Support

Türk Telekom supplies 2 Mb FR, SDH, 2 Mb PCM, fast ethernet connections for RAS systems.

XII.6. Voice Over IP



SIP, H323, H323v2, H323v3, H225.0, H225.O.G, H245, H235, H450.X protocols
ITU-T G711, G723.1, G729.A, G728, G165, G168 codec protocol
H261, H263 video over IP
T.120, T.128 multimedia conferencing
T.38 fax over IP
Ipv6, SIP, MGCP, MEGACO(H.248), OSP, SIGTRAN
G.114

XIII. ACCESS STANDARDS OF XDSL SYSTEMS

- ITU-T G.992.1 (G.DMT) for ADSL
- ITU-T G.991.2 for G.SHDSL