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Current situation regarding existing training about independent travelling of people with disabilities and Technical specifications of the interfaces for connection of the terminal equipment to the optical network of the Mobile operators in Bulgaria for data transfer

At the moment in Bulgaria there is no such kind of dedicated training and facilities/devices for independent travelling of people with disabilities. It is not foreseen any kind of organized training delivered by carers or other supportive staff which should enable people with disabilities to be trained for realization of independent route travelling.

In Bulgaria there are three authorized mobile networks operators – MOBILTEL (www.mtel.net), GLOBUL COSMOTE (www.globul.bg) and VIVACOM (www.vivacom.bg).

The standard used in Bulgarian Mobile Networks for provision of public electronic communications networks and services is IEEE 802.3. Due to the evolution of this standard, many of its varieties are used. All main and subsidiary standards used have been standardized by IEEE and the basic OSI communication model provided by the ISO is grounded on them.

Bulgarian mobile networks providers offer 3G Broadband services in band frequencies of 900MHz and 2100 MHz. 900MHz frequency band is mostly used for wide area thus suitable for rural area and 2100MHz frequency band is mostly used for urban area. The devices able of 3G transmissions in this frequency benefit coverage on 79% of Bulgarian surface, specially in the rural area, covering 56% of the population.

IEEE 802.3 standard is a set of standards that describe the communication between telecommunication devices at "Physical Layer" and "Media Access Control (MAC)" sub-level of the "Data Link Layer" of the OSI communication network model provided by ISO. This standard is reflected in the establishment of LAN and WAN links in the Bulgarian mobile network. Cited standard is being presently used to build links between Bulgarian mobile network's infrastructure and devices (switches, routers, hubs), and between infrastructure devices and CPEs.

Presently the used for data transmission could be provided by copper wire and optical fibers.

Used interfaces for connection of the terminal equipment to the optical network for data transfer and the leased by the company MAN networks and their standards are:

- 10BASE-T - offers 10 Mbit/s data transmission over twisted copper pairs. The standard used in this connection type is IEEE 802.3i.
- 10BASE-F - offers 10 Mbit/s data transmission over optical fiber. The standard used in this connection type is IEEE 802.3j.
- 100BASE-TX, 100BASE-T4, 100BASE-FX - offers 100 Mbit/s data transmission over twisted copper pairs or optical fiber. The standard used in this connection type is IEEE 802.3u.
- 1000BASE-X - offers 1 Gbit/s data transmission over optical fiber. The standard used in this connection type is IEEE 802.3z.
- 1000BASE-T - available 1 Gbit/s data transmission through two copper pairs. The standard used in this connection type is IEEE 802.3ab.
- 10GBASE-SR, 10GBASE-LR, 10GBASE-ER, 10GBASE-SW, 10GBASE-LW, 10GBASE-EW - offers 10 Gbit/s data transmission over optical fiber. The standard used in this connection type is IEEE 802.3ae.

For more and detailed information on current standards can be used web page of IEEE:

<http://standards.ieee.org/getieee802/802.3.html>.

For more and detailed information on current developments and new standards,IEEE web page can be used:

<http://grouper.ieee.org/groups/802/3/index.html>.

For more and detailed information on the OSI communication model provided by ISO standards, the following web page could be used:

<http://standards.iso.org/ittf/licence.html>.

Interfaces for leased lines usage

1.1. Electrical interfaces.

1.1.1. Electrical 2 Mbit/s interface.

2 Mbit/s	
Technical specifications in compliance with BDS	BDS EN 300 418 BDS EN 300 419
International standards	ITU-T G.704 ETSI EN 300 418 ETSI EN 300 419
Speed	2, 048 Mbit/s
Frequency tolerance	± 50 ppm (Input)
Encoding	HDB3
Impedance	75 Ω unbalanced/ 120 Ω balanced (Input and Output)
Connector	BNC, TNC

1.1.2. Electrical STM-1 interface.

155 Mbit/s	
Technical specifications in compliance with BDS	BDS EN 301 164 BDS EN 301 165
International standards	ITU-T G.957

	ITU-T G.703
	ETSI EN 301 164
	ETSI EN 301 165
Speed	155, 520 kbit/s
Frequency tolerance	± 20 ppm
Encoding	CMI
Impedance	75 Ω unbalanced / 120 Ω (Input and Output)
Connector	RJ-45

1.2. Optical STM-N interfaces.

1.2.1. Optical STM-1 interface.

155 Mbit/s	S-1.1	L-1.1	L-1.2
Range	15 km	40 km	80 km
Technical specifications in compliance with BDS		BDS EN 301 164 BDS EN 301 165	
International standards		ITU-T G.957 ETSI EN 301 164 ETSI EN 301 165	
Speed		155, 520 kbit/s	
Frequency tolerance		± 20 ppm (Port not selected as clock reference) ± 4.6 ppm (Port selected as clock reference)	
Encoding		Binary Non Return to Zero	
Laser type		MLM	SLM
Wavelength	1261nm to 1360nm	1270nm to 1360nm	1480nm to 1580nm
Optical connector		LC/PC	

1.2.2. Optical STM-4 interface.

622 Mbit/s	S-4.1	L-4.1	L-4.2
Range	15 km	40 km	80 km
Technical specifications in compliance with BDS		BDS EN 301 164 BDS EN 301 165	
International standards		ITU-T G.957 ETSI EN 301 164 ETSI EN 301 165	
Speed		622, 080 kbit/s	
Frequency tolerance		± 20 ppm (Port not selected as clock reference)	

	±4.6 ppm (Port selected as clock reference)		
Encoding	Binary Non Return to Zero		
Laser type	MLM		SLM
Wavelength	1274nm to 1356nm	1280nm to 1335nm	1480nm to 1580nm
Optical connector	LC/PC		

1.3. Optical Gigabit Ethernet interfaces.

1.25 Gbaud	1000BASE-SX	1000BASE-LX
	850nm short haul	1300nm long haul
Range	220m/500m	10 000m
International standards	IEEE 802.3	
Speed	1, 250 Mbaud	
Frequency tolerance	±100 ppm	
Encoding	Binary Non Return to Zero 8B/10B	
Laser type	VCSEL	FPL
Wavelength	770nm to 860nm	1270nm to 1355nm
Optical connector	SX	LX

1.4. Electrical Fast Ethernet interfaces.

	10Base-T	100Base-T
Range	100m	100m
International standards	IEEE 802.3	
Speed	10 Mbit/s	125 Mbit/s
Frequency tolerance	±100ppm	
Encoding	Manchester	4B/5B MLT3
Connector	RJ-45	Shielded RJ-45

Technical specifications of GSM and UMTS radio interfaces

1. Used radiofrequency spectrum in the network and basic parameters of the access channel:

GSM900:

895,800-905,000MHz – Transmission from mobile devices to base stations

940,800-950,000MHz – Transmission from base stations to mobile devices

Modulation: GMSK, 8PSK;

200kHz width of the frequency channel;
FDD – duplex distance 45MHz
TDMA – access method.

EGSM900:

880,200-881,800MHz – Transmission from mobile devices to base stations
925,200-926,800MHz – Transmission from base stations to mobile devices
Modulation: GMSK, 8PSK;
200kHz width of the frequency channel;
FDD – duplex distance 45MHz
TDMA – access method.

DCS (GSM1800):

1710,200-1720,000MHz - Transmission from mobile devices to base stations
1805,200-1815,000MHz – Transmission from base stations to mobile devices
Modulation: GMSK, 8PSK;
200kHz width of the frequency channel;
FDD – duplex distance 95MHz
TDMA – access method.

UMTS:

1920-1930MHz – Transmission from mobile devices to base stations
2110-2120MHz – Transmission from base stations to mobile devices
Modulation: QPSK, 16QAM, 64QAM;
200kHz width of the frequency channel;
FDD – duplex distance 190MHz;
CDMA – access method.

Abbreviations:

GMSK – Gaussian Minimum Shift Keying;
8PSK - 8 Phase Shift Keying;
QPSK – Quadrature Phase Shift Keying;
16QAM – 16 Quadrature Amplitude Modulation;
64QAM – 64 Quadrature Amplitude Modulation;
FDD - Frequency Division Duplex;
TDMA – Time Division Multiple Access;
CDMA - Code Division Multiple Access.

2. The radio interfaces specifications for connection of the terminal electronic communications equipment are based on ETSI/3GPP standards, which are available on Internet web sites: www.etsi.org, www.3gpp.org.

2.1. Interfaces' physical level features.

Interfaces' physical level features of GSM network correspond to ETSI GSM standards specification series 05:

Number of GSM specification	Description
ETSI GSM 04.04	Layer1; General requirements
ETSI GSM 05.01	Physical layer on the radio path; General description
ETSI GSM 05.02	Multiplexing and multiple access on radio path
ETSI GSM 05.03	Channel coding
ETSI GSM 05.04	Modulation
ETSI GSM 05.05	Radio transmission and reception for mobile stations
ETSI GSM 05.08	Radio transmission and reception for base transceiver Stations
ETSI GSM 05.10	Radio subsystem synchronization

2.2. Features of the physical level of the UMTS's network correspond to the following 3GPP standards:

Number of 3GPP specification	Version of the applicable specification	Description
25.101	5.6.0	User Equipment (UE) radio transmission and reception (FDD)
25.104	5.8.0	Base Station (BS) radio transmission and reception (FDD)
25.106	5.8.0	UTRA repeater radio transmission and reception
25.113	5.5.0	Base station and repeater electromagnetic compatibility (EMC)
25.133	5.6.0	Requirements for support of radio resource management (FDD)
25.141	5.8.0	Base Station (BS) conformance testing (FDD)
25.143	5.8.0	UTRA repeater conformance testing
25.201	5.2.0	Physical layer - general description
25.211	5.5.0	Physical channels and mapping of transport channels onto physical channels (FDD)
25.212	5.9.0	Multiplexing and channel coding (FDD)
25.213	5.5.0	Spreading and modulation (FDD)
25.214	5.9.0	Physical layer procedures (FDD)
25.215	5.5.0	Physical layer; Measurements (FDD)
25.301	5.2.0	Radio interface protocol architecture

2.3. Standards of second and third level of radio interface.

The below tables include ETSI and 3GPP standards, to which correspond the radio interfaces of GSM and UMTS networks:

Number of GSM specification	Description
ETSI GSM 04.05	Digital cellular telecommunications system; Data Link (DL) layer; General aspects
ETSI GSM 04.06	Digital cellular telecommunications system (Phase 2+); Mobile Station – Base Station System (MS – BSS) interface; Data Link (DL) layer specification
ETSI GSM 04.07	Mobile radio interface signalling layer 3; General Aspects
ETSI GSM 04.08	Mobile radio interface Layer 3 specification; Core network protocols; Stage 3
ETSI GSM 04.10	Mobile Radio Interface Layer 3 – Supplementary Services Specification - General Aspects
ETSI GSM 04.11	Point-to-Point (PP) Short Message Service (SMS) support on Mobile Radio Interface
ETSI GSM 04.60	Digital cellular telecommunications system (Phase 2+) (GSM); General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control / Medium Access Control (RLC/MAC) protocol

Number of 3GPP specification	Version of the applicable specification	Description
25.301	5.2.0	Radio interface protocol architecture
25.302	5.7.0	Services provided by the physical layer
25.303	5.1.0	Interlayer procedures in Connected Mode
25.304	5.5.0	User Equipment (UE) procedures in idle mode and procedures for cell reselection in connected mode
25.305	5.9.0	User Equipment (UE) positioning in Universal Terrestrial Radio Access Network (UTRAN); Stage 2
25.306	5.8.0	UE Radio Access capabilities definition
25.307	5.2.0	Requirements on User Equipments (Ues) supporting a release-independent frequency band
25.308	5.5.0	UTRA High Speed Downlink Packet Access(HSPDA); Overall description; Stage 2
25.321	5.9.0	Medium Access Control (MAC) protocol

		Specification
25.322	5.8.0	Radio Link Control (RLC) protocol Specification
25.323	5.2.0	Packet Data Convergence Protocol (PDCP) specification
25.324	5.4.0	Broadcast/Multicast Control (BMC)
25.331	5.9.0	Radio Resource Control (RRC) protocol specification
25.301	5.2.0	Radio interface protocol architecture

Technical specifications for fixed voice service

1. Analogue telephone interface (POTS): Corresponding to ETSI standard: **ETSI EG 201 188 V1.2.1 (2000-01)**.

Connector type: RJ-11

2. ISDN (BRI) Basic rate interface:

Corresponding to ETSI standards: **ETSI EN 300 402**. Physical interface corresponding to ETSI standard ETSI EN 300 012-1 with connector type: RJ-45.

3. ISDN (PRI) Primary rate interface:

Corresponding to ETSI standards: ETSI EN 300 403. Type of physical interface G.703 balanced or unbalanced. Connector types: RJ-45 or BNC.

4. IP Trunk:

BG network enables direct VoIP connectivity through protocols H.323 and SIP

Supported codec: G.729, G.711A, G.711U, G.723

Available Mobile phones in relation to RECALL project

No.	Type of Phones	Price BGN including VAT	Price EURO including VAT
1	HTC G1	772	394
2	HTC MAGIC	672	343
3	HTC HERO	833	425
4	HTC TATTOO	492	251
5	HTC GOOGLE NEXUS ONE	1159	591
6	HTC DESIRE	893	455
7	HTC LEGEND	840	429
8	HTC MY TOUCH SLIDE	772	394
9	HTC WILDFIRE	1239	632
10	HTC INCREDIBLE	1390	709
11	HTC LANCASTER	1420	725
12	MOTOROLA MILESTONE DROID	1410	720
13	MOTOROLA BACKFLIP	1390	709
14	MOTOROLA CLIQ DEXT MORISSON	1420	725
15	MOTOROLA CLIQ XT	1180	602
16	SAMSUNG BEHOLD 2	1420	725

17	SAMSUNG GALAXY S	1390	709
18	SAMSUNG GALAXY SPICA	1299	663
19	SAMSUNG GALAXY I7500	1299	663
20	SAMSUNG INTINCTQ M850	1299	663
21	SONY ERICSSON XPERIA X10	690	352
22	SONY ERICSSON X10 MINI	920	470
23	SONY ERICSSON X10 MINI PRO	690	352

We have no official data regarding the use of Android phones, but we can see an increase interest in this kind of phones as the national mobile network providers have made available, since January 2010.

More information about Android usage is available via: www.androidbg.com / www.all4android.com