

## TECHNICAL Specifications

EXPLORER<sup>®</sup> 100/110 - Nera WorldPro 1000/1010



**DOCUMENT NUMBER & NAME**

No.: 107859  
Name: EXPLORER 100/110 - Nera WorldPro 1000 / 1010 – Technical Specifications Rev.G

**1. SCOPE & PURPOSE**

Basic specifications for the T&T Norge BGAN Class 3 user terminals EXPLORER 100/110 - Nera WorldPro 1000/1010.

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## 3. GENERAL

The EXPLORER 100 - Nera WorldPro 1000 series are a Class3 User Terminal is Inmarsat approved with Certificate Number B3NR01 TAP001 of 28.November 2005.

The terminal appears to the user as a communication port providing access to the 3G UMTS communications network via the Inmarsat I4 satellites. The terminal will adhere to the UMTS PS/CS mode of operation. A user will access the BGAN services through one of the terminal interfaces.

The Class 3 terminal is a portable device, which means that it is only meant to be used under stationary conditions. The product complies with the requirements of the R&TTE Directive 1999/5/EC.

Easy use and setup:


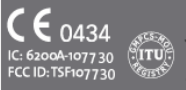

A new user without any experience should be able to get up running with a data connection from a PC within 15 minutes after the product is opened for the first time. The terminal provides stable data access and telephone dialling at a low price, from everywhere.

- ▶ Easy to bring along
- ▶ Easy to install
- ▶ Easy to use
- ▶ Flexible

The difference between the EXPLORER 100 - Nera WorldPro 1000 and the EXPLORER 110 - Nera WorldPro 1010 is basically the user interface.

- ▶ EXPLORER 100/Nera WorldPro1000 is delivered with a handset interface (ISDN), Bluetooth and USB interface.
- ▶ EXPLORER 110/Nera WorldPro1010 is delivered with a handset interface (ISDN), Bluetooth, USB via ISDN splitter cable and Ethernet interface.

### 3.1 Tactical & Technical Characteristics

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>▶ Name of Satellite terminal:</li> <li>▶ Type and character of Satellite terminal:</li> <li>▶ Place of installation of Satellite terminal:</li> </ul>  | <p>EXPLORER 100/110 - Nera WorldPro 1000/1010<br/>Portable Mobile Satellite Terminals<br/>Antenna unit to be placed outdoor and modem unit indoor or both placed as one unit outdoor.</p>   |
| <ul style="list-style-type: none"> <li>▶ Size of Satellite terminal (approx.)</li> <li>▶ Designation of Satellite terminal:</li> <li>▶ Area of usage:</li> <li>▶ System including Satellite terminal:</li> <li>▶ Necessity to be registered at ITU:             <ul style="list-style-type: none"> <li>• CE 0434</li> <li>• FCC ID: TSF107020 and TSF107730</li> <li>• IC: 6200A-107020 and IC: 6200A-107730</li> <li>• GMPCS MOU Registry</li> </ul> </li> </ul> | <p>20cm x 14cm x 4cm<br/>Portable Mobile Satellite Terminals<br/>See coverage map at <a href="http://www.Inmarsat.com">http://www.Inmarsat.com</a><br/>Integrated unit incorporating a flat panel antenna<br/>CE/FCC and GMPCS marking approved</p>             |
| <ul style="list-style-type: none"> <li>• Japanese Radio Licence R001VZAA-1029</li> </ul>  |    |

## 4. STANDARD DELIVERIES EXPLORER 100/110 - NERA WORLDPRO

### 4.1 EXPLORER 100/Nera WorldPro 1000 (Item No.: 107020)

Nera WorldPro 1000 is delivered with these components as standard:

- ▶ Interface unit, with built in Bluetooth
- ▶ Antenna unit, BGAN antenna with a built in GPS Receiver Unit
- ▶ USB cable (1,8 meter)
- ▶ Battery (Rechargeable Li-Ion)
- ▶ AC/DC adapter with EN 50075 AC plug
- ▶ Getting Started manual and CD, including Inmarsat common PC User Interface, the "BGAN LaunchPad"

### 4.2 EXPLORER 110/Nera WorldPro 1010 (Item No.: 107730)

Nera WorldPro 1010 is delivered with these components as standard:

- ▶ Interface unit, with built in Bluetooth
- ▶ Antenna unit, BGAN antenna with a built in GPS Receiver Unit
- ▶ Ethernet Cable (2 meter)
- ▶ Battery (Rechargeable Li-Ion)
- ▶ AC/DC adapter with EN 50075 AC plug
- ▶ Getting Started manual and CD, including Inmarsat common PC User Interface, the "BGAN LaunchPad"

## 5. TECHNICAL SPECIFICATIONS

### 5.1 Services

The terminal offers simultaneous CS voice and PS data connection

- ▶ Voice: 4.0 kbps voice (AMBE+2 codec)
  - Support speech to/from the PSTN / ISDN / 2G / 2.5G / 3G terrestrial network
  - Supporting DTMF
- ▶ Emergency Call Teleservice
- ▶ SMS: Short message service (maximum 160 characters in each message)
- ▶ PS Data:
  - Symetric IP (Forward: 32 and 64 kbps, Return 32 and 64 kbps) (CBR)
  - Standard IP bit rates up to 384/240 kbps on shared channels (384 downstream/ 240 upstream)(VBR)

The BGAN will offer a constant bit rate (CBR), or variable bit rate (VBR) packet service negotiated on a per session basis between the BGAN terminal and BGAN Core Network.

A range of bearer rates will be supported within the air interface physical layer design and supported protocol stack. These bearer rate will depend upon the actual physical conditions. E.g. geographical position in the spot, pointing, modulation and channel spacing.

#### 5.1.1 Supplementary Services

Some of the Supplementary Services supported

- ▶ Voice mail
- ▶ Call Line Identification Presentation (CLIP)
- ▶ Call Forwarding on Mobile Busy / No Reply / Not Reachable
- ▶ Call Waiting (CW)
- ▶ Call Barring



## 5.1.2 BGAN Circuit Switched Services (CS)

Used for the BGAN voice service. Terminal Equipment (TE) used for this service are:

- ▶ Nera Handset with SMS
- ▶ Bluetooth handset
- ▶ Any ISDN phone
- ▶ Dect phone with ISDN base-station
- ▶ Analogue phone, connected via Terminal Adapter (TA)
- ▶ Bluetooth Handsfree

## 5.1.3 BGAN Packet Switched Services (PS)

Typical IP services to be supported from the UT includes:

- ▶ E-mail and messaging (including GPRS/UMTS based SMS);
- ▶ Data file transfer;
- ▶ Video Conferencing;
- ▶ Internet access (including web browsing);
- ▶ Intranet access (including virtual private networks)(VPN);
- ▶ IP telephony (including conferencing and messaging services);
- ▶ IP Facsimile;
- ▶ IP Multi-casting/broadcasting;
- ▶ Internet streaming (audio/video);
- ▶ Paging
- ▶ IP-Crypto (only Nera WorldPro1010)
- ▶ SCADA

## 5.1.4 SIM Card

- ▶ Easy to insert / replace SIM card
- ▶ 3G compatible USIM cards to be used. Contact DP (Distributor Partner) or SP (Service Provider).

## 5.2 Functions

Many user functions are implemented

- ▶ Supervision and control from handset (Nera WorldSet)
- ▶ Configuration and control from PC MMI (BGAN LaunchPad)
- ▶ SMS support from handset and PC MMI
- ▶ Traffic logging
- ▶ SIM card operation
- ▶ Phone book from Handset and "Launch Pad"
- ▶ In addition the EXPLORER 110/Nera WorldPro 1010 have a built in WEB MMI
- ▶ SMS activation/deactivation of the IP-connection

## 5.3 User interface / Connectors:

Following user interfaces are initially available:

- ▶ USB
- ▶ Bluetooth (both voice and data)
- ▶ ISDN (Used for voice AMBE+2)
- ▶ Ethernet (Only EXPLORER 110/Nera WorldPro 1010)

Flexibility in configuring the terminal for various user applications. All interfaces may be connected simultaneously (both wired and wireless).

## 5.3.1 USB (Universal Serial Bus)

- ▶ 1 pc. USB Device-port (this is not a USB Host port)
- ▶ Data rate Up to 12 Mbps
- ▶ USB version 1.1
- ▶ USB port supports dual operation (data communication and MMI)
- ▶ USB modem driver needed
- ▶ Max length of cable: 5 m
- ▶ On EXPLORER 110/Nera WorldPro 1010 an ISDN/USB Splitter is needed to get access to the USB interface.

## 5.3.2 Bluetooth (common both terminals)

- ▶ Built in BT antenna in Interface unit
- ▶ Data rate 2x432,6 kbps
- ▶ Registration default code, Passkey: "0000"
- ▶ Supported profiles:
  - Supporting Dedicated Wireless Handset for voice.
  - Serial Port Profile (SPP)
  - Dial Up Networking (DUN)
  - Hands-free profile (HSP)

### 5.3.2.1 Bluetooth and EXPLORER100/Nera WorldPro 1000

- ▶ BT Class 2, version 1.2
- ▶ Maximum separation Interface unit and BT device is up to 10 meter (through 3 panes of uncoated glass windows)

### 5.3.2.2 Bluetooth and EXPLORER 110/Nera WorldPro 1010

- ▶ BT Class 1,
- ▶ Maximum separation Interface unit and BT device is up to 30 meter (through 3 panes of uncoated glass windows)

## 5.3.3 ISDN (Integrated Services Digital Network)

- ▶ 1 pc. RJ-45 connector
- ▶ 1x64 kbps + 16 kbps (1xB+D)
- ▶ Standard: ISO/IEC 8877:1992 ITU-T Recommendation I.430
- ▶ ISDN protocol: Euro-ISDN(DSS1),
- ▶ Max drain 40mA @ 40V (1,5 W)
- ▶ Max length of cable: Up to 100 meter, refer ITU spec I.430
- ▶ Impedance: 120  $\Omega$  int.
- ▶ ISDN port on EXPLORER 110/WorldPro 1010 supports also USB when an ISDN/USB Splitter cable is connected.

## 5.3.4 Ethernet (EXPLORER 110/Nera WorldPro 1010)

- ▶ 1 connector, RJ45
- ▶ 10 Base-T 100 Mb/s
- ▶ IEEE 802.3
- ▶ MDIX Compliant
- ▶ Transparent forwarding

## 5.4 On Box MMI

The terminal is equipped with 1 button and 4 diodes on the Interface Unit, and 1 buttons and 1 diode on the antenna unit (only visible when terminal is separated).  
When powered on all LEDs light up green.

When powered off all LEDs light up red.

## 5.4.1 Interface Unit

- ▶ One “Activate” button for power ON/OFF the terminal (hold button for 1.5 seconds)
- ▶ “Activate” button is used to activate/deactivate pointing aids (Signal LED)(button is pressed shortly)
- ▶ 4 diodes indicates:
  - Battery
    - Green when more than 40% battery capacity remains or DC power connected
    - Yellow when below 40% capacity
    - Flashing Yellow when charging
    - Red when below 10% capacity, please charge battery
  - Bluetooth
    - Off , BT is not used
    - Green when BT equipment is connected
    - Yellow BT is enabled on terminal, but no BT equipment is connected
    - When a BT pairing has been initiated, the LED is flashing green
  - Signal
    - Red when no satellite signal and no GPS
    - Yellow when GPS is detected, but no satellite signal
    - Green when satellite signal and GPS is detected
  - Message
    - Off = no messages
    - Green when SMS message is received or voice mail waiting
    - Red when there is an alarm (not possible to use the terminal) Read alarm using Nera ISDN handset or PC MMI

## 5.4.2 Antenna Unit

- ▶ One button for activating buzzer and diode for pointing antenna.
- ▶ Buzzer and diode indicates:
  - Buzzer signal increases in frequency when finding better satellite signal
  - Signal LED for satellite signal indication
- ▶ Buzzer and LED can be configured “off”

## 5.4.3 Sleep Mode

Only the battery LED is used, and is only flashing slowly. All other LED's are off

When the terminal is in sleep-mode, a short press on the “Activate” button will cause the LEDs to show their status for 30 seconds.

Terminal will automatically wake up if there are user activities on any ports, or incoming call.

NB: The terminal does not enter Sleep Mode when Bluetooth is enabled.

## 5.5 Cabling Interface Unit - Antenna Unit

Antenna unit separation from Interface unit, made possible to give the user more flexibility when installing the equipment.

- ▶ Different split cables with variable lengths will be available. (3 meter, 10 meter, 20 meter and 30 meters)
- ▶ Maximum separation is 30 meters.
- ▶ Only use dedicated cables

## 5.6 Power Input to EXPLORER 100/110 - Nera WorldPro

### 5.6.1 DC Power connector

- ▶ Center-pin = positive polarity
- ▶ hollow-plug  $\varnothing 2,1 \times \varnothing 5,5 \times 10,0 \text{mm}$
- ▶ 12 VDC -10%/+30% feed (10,8VDC - 15,6VDC)
- ▶ Protection against incorrect connection of polarity

## 5.7 Battery

- ▶ 7,2Volt 2400mAh Li-Ion battery (Rechargeable)
- ▶ Standby 36 hours
- ▶ 1 hours continuous transmission at  $\geq 72$  kbps at nominal EIRP at edge of coverage and edge of beam. (Using USB port)
- ▶ 1 hour continuous reception (at full rate)
- ▶ 5 hours (typical active use, 20% activity factor)
- ▶ The built in battery will be charged via the DC power connector
- ▶ Charge to maximum: 3 hours (terminal does not charge battery when transmitting)
- ▶ Charging temperature  $0^{\circ}\text{C}$  to  $55^{\circ}\text{C}$  ambient
- ▶ Operating temperature  $+5^{\circ}\text{C}$  to  $55^{\circ}\text{C}$
- ▶ Easy battery replacement
- ▶ Terminal can be used without battery

### 5.7.1 Battery ageing

- ▶ Given normal storage & usage, user can expect the battery to deliver 80% or more of its initial capacity after 300 charge/discharge cycles, limited for 6 months from delivery.

### 5.7.2 Charging battery in terminal

- ▶ The Nera WorldPro battery is based on a standard switch mode lithium ion battery charger circuit that gives CC / CV (this is not a linear charger or pulse charger). The charger also has the feature that it monitors the input current to the terminal and can reduce the charge current if the total current into the terminal reach a defined threshold. This gives us the benefit of charging with a normal charging current that will reduce the charge time when the activity in the terminal is low. When the activity is high in the terminal (e.g. TX is active), then the charge current will be reduced. This solution gives a good trade off between charge time, heat generation in the terminal and size of AC/DC wall adapter.
- ▶ Recharging a partially charged lithium-ion does not cause harm because there is no memory. (In this respect, lithium-ion differs from nickel-based batteries.) The charger is based on a CC / CV charger that we in some cases reduce the CC limit.

## 5.8 AC/DC Adapter

- ▶ Input voltage: 100-240 VAC +/- 10% 50-60Hz 800mA
- ▶ Delivered with an EN 50075(Euro) AC plug
- ▶ Output Voltage: 12 VDC +/- 10%
- ▶ Output current: 2.5 A max 35W
- ▶ Connector: hollow-plug  $\varnothing 2,1 \times \varnothing 5,5 \times 10,0 \text{mm}$
- ▶ Protections: Overheat/ Overload/ short circuit



## 5.9 DC/DC Adapter

- ▶ Input voltage: 10- 32 VDC 30W
- ▶ Car-plug for 21 and 12 mm with 8 ampere fuse, cable length 2 m
- ▶ Output Voltage: 12 VDC +/-5%, load 30W maximum
- ▶ Connector: hollow-plug  $\varnothing 2.1 \times \varnothing 5.5 \times 10.0$ mm with IP protection, cable length 1,5 m
- ▶ Protections: Overheat/ Overload/ short circuit

## 5.10 Power Consumption

The terminal can be operated on battery, and the design is made to minimise power consumption.

- ▶ Sleep mode: 0.5W
- ▶ Transmission: < 20W (depending on satellite signal, devices connected, activity factor)

## 5.11 Dimensions and Weight

A Class 3 User Terminal = A5 size

- ▶ C3 terminal, Seamless all in one: 20cm x 14.5cm x 4.5cm
- ▶ Split configuration:
  - Interface unit: W=14.5 cm, D=9.2 cm, H=2.7 cm
  - Antenna unit: W=15 cm, D=20 cm, H=4.5 cm
- ▶ Weight including battery: <1.0 kg
- ▶ Integrated nut of standardised dimension (1/4") for camera stands. ISO Metric 6 mm

## 5.12 Environmental

- ▶ Storage device: -40°C - +80°C
- ▶ Storage battery: -20 °C - +40°C
- ▶ Operational:
  - IDU: -20°C - +55°C, 40°C 95 % humidity (non-condensing), without battery (ref sec. 5.7)
  - ODU: -20°C - +55°C, 40°C 95 % humidity (non-condensing)
  - Infrared: 500 W/m<sup>2</sup>
  - Ultra violet: 54 W/m<sup>2</sup>
  - Visible sunshine: 1150 W/m<sup>2</sup> MIL-SPEC 810E 505.3
  - Ice: 6mm (Non-operational)
  - IP:
    - Interface unit: IP42
    - Antenna unit: IP44 when the antenna split cable is used.

When Interface Unit and Antenna Unit is separated, the IP grading is based on use of specified antenna cable, and also use of the connector IP housing on all cables delivered to Nera WorldPro.

## 5.13 Shock and Crash Hazard

Vibration (operational):

- ▶ 5 Hz to 20 Hz: 0.24 m<sup>2</sup>/s<sup>3</sup> (+0/-5 %)
- ▶ 20 Hz to 500 Hz: 0.24 m<sup>2</sup>/s<sup>3</sup> (+0/-5 %) at 20 Hz, thereafter -3 dB/Octave (+0/-5 %)

Robustness and shock (unpacked drop): 0.5 m on concrete

Air Pressure Transport: 4500m AMSL: MIL-SPEC 810E 500.3

Wind Load: C3 UT shall withstand a wind load of 65 km/h in upright position.

## 5.14 ANTENNA CHARACTERISTICS

- ▶ Designation of Antenna: Integrated flat panel
- ▶ Antenna Type: RHCP Right Hand Circular Polarized antenna
- ▶ Antenna Size: 12 cm x 12 cm x 1 cm
- ▶ Position of beam in space: Variable from 5 deg. of elevation and 360 azimuth
- ▶ Frequency: 1525MHz - 1660.5 MHz
- ▶ Antenna gain: 9 dBi
- ▶ Width (3dB): Hor.60 deg./Ver. 60deg. (+/-30deg.)
- ▶ Guiding accuracy: 0.3 dB pointing loss
- ▶ Feeder type: 90% hybrid
- ▶ Critical frequency: Nominal frequency  $\pm$  500 Hz
- ▶ Wave impedance of : Antenna impedance = 50  $\Omega$

### 5.14.1 FREQUENCY BANDS (FB)

- ▶ No. of FB: One contiguous frequency band using the ITU MSS band allocation
- ▶ Min. frequency of FB: TX: 1626.5MHz, RX: 1525MHz
- ▶ Max. frequency of FB: TX: 1660.5MHz, RX: 1559MHz

### 5.14.2 Characteristics of Radio Receiver

- ▶ Type of receiver: Superheterodyne
- ▶ Operating frequencies: 1525MHz to 1559MHz
- ▶ Spectrum span: 34MHz
- ▶ Sensitivity: 133.1 dB W/m<sup>2</sup> in 151.2 KHz for 0 dB SNR
- ▶ Interference Type: Geostationary satellites  
Satellites Terrestrial base stations with omnidirectional antennas
- ▶ Type of oscillator tuning: Multiple PLL/DLL with tuning step of 1.25kHz step
- ▶ Equivalent noise temperature: 240K
- ▶ Relative instability of oscillator frequency:  $\pm$  5 ppm
- ▶ Adjacent channel: 30dB at +/- 60% from centre frequency of nominal bandwidth 8.4,33.6 or 151.2KHz
- ▶ Blocking and intermodulation distortions: 0.1 to 1400 MHz and 1626.5MHz to 4GHz up to -45dBW/m<sup>2</sup>

### 5.14.3 Characteristics of Radio Transmitter

- ▶ Operating frequencies: 1626.5MHz to 1660.5MHz
- ▶ Type of frequency re-tuning: Tunable over the range with 1.25kHz kHz step
- ▶ Spectrum span (step of spectrum grade): 200 kHz
- ▶ Emission Class: Class 3
- ▶ Characteristics of emission class: 10 dBW
- ▶ Emission Power (typical): 10 dBW
- ▶ Emission Power (min): 4 dBW
- ▶ Emission Power (max): 11 dBW
- ▶ Modulation: Pi/4 QPSK with roll off 25% square-root cosine filtering
- ▶ Max Spectrum Density of dB W/Hz: See table below:

Fx	Amp [dB]	T0.5 [KHz]	T1[KHz]	T2 [KHz]	T4.5 [KHz]
F1	-20	15.7	31.4	62.9	133.6
F2	-25	32.7	65.5	131.0	256.0
F3	-30	34.7	69.4	138.8	282.6
F4	-45	65.5	131.0	262.0	450.0

Table 2-13 : Transmit Power Spectral Density Mask for pi/4 QPSK Class 3 UT

- ▶ Type of output device: 2.5W Solid State Amplifier
- ▶ Relative instability of frequency: Less than  $\pm 150$  Hz for  $>99.7\%$  of bursts
- ▶ Relative level of indirect emissions: -70 dBW/MHz in the band 1559-1605 MHz  
-70 dBW/MHz at 1605 MHz to -10 dBW/MHz at 1610 MHz, linear interpolated
- ▶ On harmonics (up to 3 fp): -60dBW to EN301681 dB
- ▶ On harmonics (over 3 fp): -60dBW to EN301681 dB
- ▶ Other kinds of indirect emissions: Ref. EN301681 dB

#### 5.14.4 GPS

- ▶ 12 channel passive GPS receiver
- ▶ GPS antenna is located on the top left corner of the antenna, seen from behind.

#### 5.14.5 Bluetooth (V1,2) Class2 (EXPLORER 100/Nera WorldPro 1000)

- ▶ Frequency band: 2400 - 2483.5 MHz
- ▶ RF channels: 1 MHz spacing with 2 MHz lower guard band and 3.5 MHz upper guard band
- ▶ Power class: Class 2: max output= +4 dBm
- ▶ Modulation: GFSK
- ▶ Frequency accuracy:  $\pm 75$  kHz

#### 5.14.6 Bluetooth Class1 (EXPLORER 110/Nera WorldPro 1010)

- ▶ Frequency band: 2400 - 2483.5 MHz
- ▶ RF channels: 1 MHz spacing with 2 MHz lower guard band and 3.5 MHz upper guard band
- ▶ Power class: Class 1: max output= +20 dBm
- ▶ Modulation: GFSK
- ▶ Frequency accuracy:  $\pm 75$  kHz

## 6. SAFETY AND PRECAUTIONS

- ▶ Radiation Hazard warning label located on Antenna Unit, The radiation Hazard is in front of the antenna.
- ▶ Battery must be charged in the terminal only
- ▶ A safety strap is recommended used on the Antenna Unit, if there is any chance for it to fell down to cause damage. The Antenna Unit can easily be secured with a safety strap.

## 7. RELIABILITY

A high quality standard is maintained by Thrane & Thrane AS.

- ▶ The product is designed for outdoor use, under harsh climatic conditions.
- ▶ The metal and plastic materials used, are selected to make an elegant and robust portable satellite terminal.
- ▶ The MTTF is calculated to be 7 years on this terminal. (Excluding battery and other consumables)

## 8. ACCESSORIES

- ▶ EXPLORER ISDN Handset/Nera WorldSet, handset for Voice, SMS, Supervision and Control
- ▶ Split cable to connect separated Interface unit and Antenna unit
- ▶ Bluetooth handset
- ▶ DC/DC adapter
- ▶ DC cable for car power plug
- ▶ Soft Case
- ▶ Brackets for antenna

## 9. ABBREVIATIONS

▶ BGAN CN:	BGAN Core Network
▶ BGAN UT:	BGAN User Terminal
▶ BGAN:	Broadband Global Area Network, using Inmarsat I4 (4 <sup>th</sup> generation) satellites
▶ BT:	Bluetooth
▶ C3:	Class3: Land Portable small device
▶ CS:	Circuit switched (User pay per minute)
▶ CBR:	Constant Bit Rate
▶ Downstream:	Receive data to UT
▶ I4:	4 <sup>th</sup> generation Inmarsat satellites, launched 2005-2006
▶ PC MMI:	Man Machine Interface, used for supervision and control from PC
▶ PS:	Packet Switched (User pay for data Bytes sent and received)
▶ SMS:	Short Message Service
▶ Terminal:	Consists of Interface Unit and Antenna Unit, can be separated using a split cable.
▶ TE:	Terminal Equipment
▶ Upstream:	Transmit data from UT
▶ USIM:	Universal Subscriber Identity Module
▶ UT:	User Terminal
▶ VBR:	Variable Bit Rate

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