

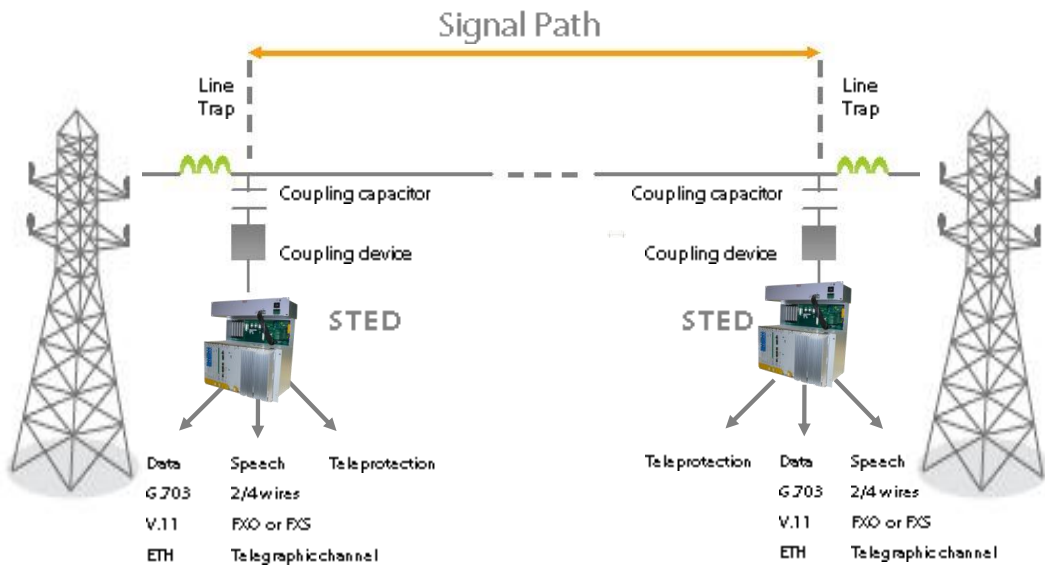


UNIVERSAL POWER LINE CARRIER EQUIPMENT WITH INTEGRATED TELEPROTECTION

SELTA offers a complete line of PLC products such as line traps, coupling devices, PLC terminals, and teleprotection equipment and also supports the Client in the design of a customised PLC system.

STE-D, the universal SELTA PLC system, is a new generation of high performing analog and digital PLCs, based on Digital Signal Processing technology (DSP), supporting all applications from legacy analog to most advanced digital solutions with a future-proof concept.

The new STE-D is able both to interface toward teleprotection devices and to support the integrated teleprotection functionality internally.



Benefits

- Cost attractiveness in case of transmission of small to medium information flows over medium/long distances
- High reliability for service operation communications (in particular voice, remote control and teleprotection) in case of HV and HHV power lines
- Possibility to employ it as back-up bearer to increase the availability of telecommunication service
- Security of maintenance and configuration through Radius authentication and SSH support





Bit rate vs bandwidth

	16 kHz Bandwidth		8 kHz Bandwidth		4 kHz Bandwidth	
	from	to	from	to	from	to
Bit Rate	92.8 kb/s	16 kb/s	64 kb/s	8 kb/s	32 kb/s	4 kb/s
S/N @ BER 10^{-7}	28 dB	8 dB	> 30 dB	8 dB	> 30 dB	8 dB



PLC universal equipment

STE-D can be configured through a dedicated tool depending on customer's need:

- it can be used as an access node in TDM networks through a multiplexer with drop/insert function
- it can be employed in IP networks through an integrated router
- it works as analogue or as hybrid analog/digital PLC equipment with a dedicated BBPU (Base Band Processing Unit)
- an interface for teleprotections reduces costs and manages 1 to 8 commands

STE-D integrates the key applications of energy utilities:

- transparent transmission of voice-frequency signals, such as band limited speech with superimposed remote operation;
- digital transmission of compressed voice;
- transmission of up to 4 voice channels not compressed;

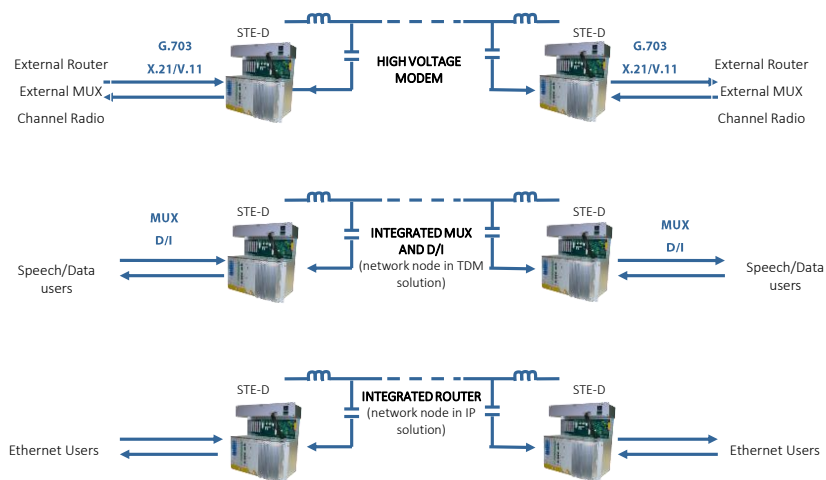
- fully transparent transmission of asynchronous data up to 19200 bps with minimum delay in point-multipoint applications, typical of SCADA polling;
- adaptive multiplexing of data services with traffic flow control;
- synchronous data transmission from 1,2 kbps up to 92,8 kbps;
- Ethernet/IP routing/bridging for LAN interconnections;
- easy connection of external switches, multiplexers and routers for network integration, service aggregation and traffic management via standard interfaces.

STE-D can transmit at different bit rates with error correction through the Trellis Code Modulation and the use of FEC (Forward Error Correction) technologies.

Integrated teleprotection

A teleprotection unit is integrated in STE-D and allow to manage up to 8 commands, with several benefits:

- complete configurability of both the use and the priority of the commands;
- independent and / or simultaneous management of the commands;
- different protection schemes editable by the user with reliability, security and transmission times compliant with IEC 60834-1 standard
- wide programming of the command parameters
- set-reset command (continuous commands)
- alarms configurability
- events recording in non-volatile memory (2048 events: commands and alarms, 1ms resolution).
- commands statistics
- command crossing time test
- LAN interface for configuration and diagnostics
- time synchronization By IRIG-B and NTP



General characteristics

Bit rate: up to 92.8 kb/s @ 16 kHz

Bandwidth: 4, 8, 16 kHz, with possibility of overlapping transmission/reception with echo canceler

Modulation: QAM/TCM

Frequency range: 40 ÷ 500 kHz

Carrier frequency: programmable

BER: $< 10^{-7}$ with S/N=28 dB (noise measured in 16kHz)

Max. line attenuation: up to 40 dB

User interface: X.21/V.11, ITU-T G.703 co-directional

Line connection balanced/ unbalanced.

Nominal impedance

- 50, 75 Ω (unbalanced)
- 124, 150 Ω (balanced)

Return loss ≥ 12 dB

Full compatibility with the analog transmission systems

Configuration and monitoring of local and remote equipment

Integrated multiplexer and Drop-Insert function (ITU-T X.50)

Router/Bridge integrated functions

Adaptive bit rate

Automatic channel equalization

Integrate multiplexer

Data interface X.20bis/V.28 and X.21bis/V.28 from 1.2Kb/s up to 19.2Kb/s.

Connections: Point-Point and Point-Multipoint

Voice Interfaces: 2/4 wires + E/M, FXS, FXO

Voice compression: ITU-T G.729A (8 kb/s) and G.726 ADPCM (16, 24, 32, 40 kb/s compression)

FXS-FXO and FXS-FXS (direct call)

Integrate call generator

Analog interface for telegraphic services:

300÷3720Hz / 300÷3400Hz

Digital interface towards teleprotections (TPU_POF)

Type of interface: POF (Plastic Optical Fiber)

Input criterion: teleprotection signals pulse

System performances

V11 G.703 data interface 92.8 kb/s ÷ 3.2 kb/s

10 TBase Ethernet Interface 92.8 kb/s ÷ 3.2 kb/s

TDM and IP over the same carrier

Security

SSH secure communication session with

Authentication at Local Server or Radius Server

Power supply

Input voltage:

24 Vdc (+20%, 15%)

48Vdc (+20%, 15%)

110 Vdc (+ 20%, -15%)

Consumption: ≤ 300 Watt (with complete equipment)

Output power (PEP at the peak): 2/80 W

Environmental features

Temperature: (-5 ÷ 55) °C

Relative Humidity: 93% @ 40°C (compliant with IEC 721-3-3)

Mechanical features

Dimensions: 483 x 400 x 280 mm

Weight: < 14 Kg fully equipped



System data

Transmitted information: voice, telegraphic transit, low/high speed data, teleprotection signalling

Channels nr.: up to 4

Effective LF bandwidth 300÷3720 Hz

Kind of transmission: SSB

HF bandwidth: 40 ÷ 500 kHz

Bandwidth: 4 kHz

Canalization

- Tx/Rx on adjacent bandwidth
- Tx/Rx on spaced bandwidth

Output power (P.E.P.) 2–80W

Low frequency (LF) voice

Speech bandwidth

- 300÷2000; 300÷2200 Hz (progr.)
- 300÷2400; 300÷3400 Hz

Interface: 2/4 wires (programmable)

Impedance: 600 Ω balanced

Ground Balancing: 40 dB

Balancing: 14 dB

Compressor: can be disabled through configuration or external control

Integrated telegraphic source

Kind of modulation: FSK, ON/OFF

Speed and channeling: compliant with ENEL, CCITT R35, R37, R38 A and B e V23 standards

Universal call converter

Setting mode: Automatic line extension (ALE)
Central battery (CB)
Local battery (LB)

Connection to phone / exchange: 2 wires

Impedance: 600 Ω balanced

Insertion loss: 2 dB

Call generator: Frequency: 25/50 Hz programm.
Voltage: 50 Vrms su 3kΩ
Power: 20 mA (max)

Call receiver : sensibility: 20 Vrms
impedance: 3 kΩ

Telegraphic transit

Nº. of channels: 1 to 3

Selectable bandwidth: 2240÷3720; 2440÷3720 Hz
2640÷3720; 300÷3720 Hz;
2160÷3400 Hz

Interface: 4 wires

I/O impedance: 600 Ω balanced

Balance on the ground: 40 dB

Balancing: 14 dB

3c/2b local loop: available

Asynchronous data modem

Nominal value: 50/100/200 Bd (ITU-T/ENEL)
600 Bd (ENEL)
600/1200 Bd V.23

Data interface: ITU-T V.24/EIA RS232

3c/2b local loop: available

B.N.B.F

Useful channel bandwidth: 300÷3720 Hz

3c/2b local loop: available

Analog interface towards teleprotections (TPU-BF)

Interface: 4 wires

Impedance: 600 Ω sbilanciata

Bandwidth: 0.....4 kHz (Tx) e 12...16 kHz (Rx)

Balancing: 14 dB

Input criterion: teleprotection signals pulse

High frequency section (HF)

Output power (P.E.P.): 2–80 W

Line impedance (2 wired): 50, 75 Ω unbalanced
124, 150 Ω balanced

Return loss: ≥ 12 dB

Tx/Rx filter programmable line: 40÷500 kHz

Spurious emissions: compliant with IEC 495

AGC: available

Channel equalization: ± 12 dB

Frequency stability and accuracy: ±20 ppm up to -5÷ +45°C

Diagnostic/maintenance

On line diagnostic

- control of configuration
- control of Tx HF power
- measurement of line attenuation and S/N ratio

Channel equalization: semi-automatic

Service channel: FSK(±30Hz) 50Bd

