

ZIV HV COMMUNICATIONS



Utility Week
LIVE
2024
| 21-22 MAY | HALL 12
| NEC BIRMINGHAM

Communications Portfolio

Universal Power Line Carrier

It integrates a great variety of interfaces that allow the simultaneous transmission of analog and digital channels including different possibilities for the transmission of teleprotection signals.



Compact Power Line Carrier

Analogue PLC Terminal with Built-in Teleprotection



Line Matching Unit

Adaptable Line-Matching Unit for PLC systems over HV lines



Universal Teleprotection

Highly flexible configuration for diverse applications, compatible with IEC 61850 ed 2 standard.





OPU-1

Universal Power Line Carrier



- Analogue and Digital PLC in the same equipment.
- Both QAM and OFDM modulations available for the digital data transmission.
- One or two analogue channels (4kHz).
- Selectable total bandwidth (4, 8, 12, 16, 20, 24 or 32 kHz) depending on requirements.
- 20, 40 and 80W models (PEP).
- Multiple connection interfaces for the user (V.35, V.11, V.24, V.28, G.703, Ethernet).
- Teleprotection inside the digital QAM band or inside an independent analogue channel.
- Possibility of double HF stage for T-lines. Redundant power-supply and advanced management options (Web Management and SNMP agent).
- Possibility of synchronization by external GPS

OPL-1T

Compact Power Line Carrier



- Frequency range from 40 to 500 kHz, programmable in 1 Hz steps
- 20, 40 or 80W P.E.P. available versions
- 5U high terminal (10 s.u. for the 80W version)
- On field adjustable Reception and Transmission line filters
- Configurable as Single (4 kHz) or Twin (8 kHz) channel
- 2 or 4-command integrated teleprotection system (optional)
- Different optional submodules for speech, data or external signals transmission
- Management through USB with WEB server installed in the PC
- Possibility of synchronization by external GPS
- Selectable transit filter included in the AF I/O optional submodule

UAPA-1

Line Matching Unit



- Designed according to IEC 60481 standard (composite loss ≤ 2 dB and return loss ≥ 12 dB in the selected bandwidth).
- Nominal power (P.E.P): 400 W for two tones.
- Distortion and intermodulation: 80 dB below the level corresponding to the nominal P.E.P.
- Band-pass or high-pass filter configuration.
- Can be equipped with a differential hybrid circuit.
- Power frequency insulation: >10 kVrms.
- Frequency range: 40÷500 kHz.
- Coupling capacitor: 2 to 10 nF. Specific model for 2 to 12.5 nF.
- Equipment-side impedance: 50 and 75 Ω . Others on request. Specific model for 150 Ω .
- Line-side impedance: 100 to 600 Ω .
- Protection elements: Line side: earthing switch, air-gap surge arrester and an optional solid-state surge arrester. Equipment side: gas surge arrester.
- Optional mounting: line connection at the bottom of the chassis or protection elements on the outside.
- Box and cover: GRP (glass-fibre reinforced polyester) in RAL-7035. Specific model in stainless steel.

TPU-1

Universal Teleprotection



- For analogue and/or digital channels
- Two communication channels available
- Electrical and Optical digital line interfaces
- Up to 4 commands over analogue channel
- Up to 8 commands over digital channel
- Command transmits for “T-Lines” applications
- Interface to protection relay by electrical contacts or IEC 61850 protocol
- Optional redundant power supply



UNIVERSAL TELEPROTECTION SYSTEM TYPE TPU-1

Latest developments

MWTU.02 (4.x) MODULE

NEW WEB MANAGEMENT

MWTU VERSIONS

MWTU.02 (5.x) MODULE

IEC 61850 COMPATIBILITY

KWTU SUBMODULE

IOCS MODULE

IDTU MODULE

IETU MODULE

WEB MANAGEMENT

AVAILABLE MODULES

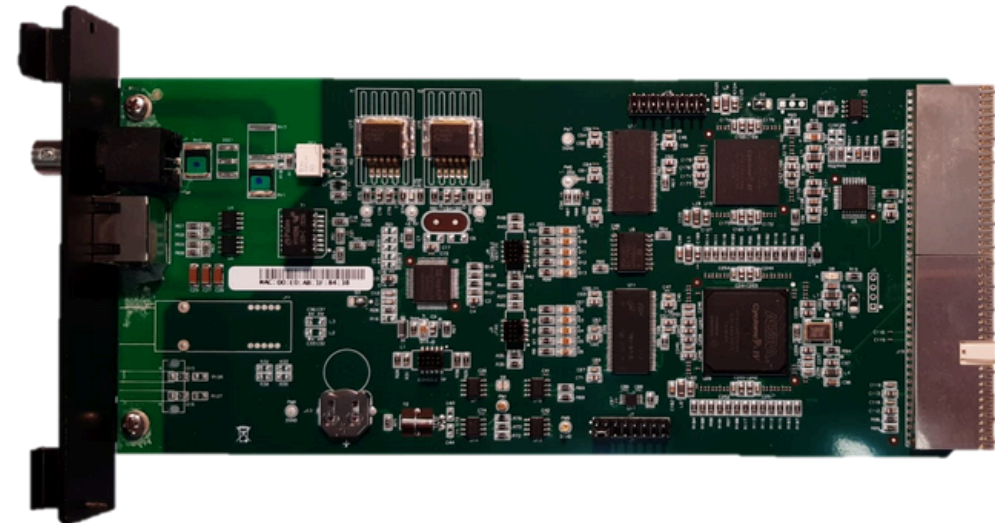
MODULES COMPATIBILITY

MWTU.02 (4.x) MODULE

New features in 3.9 version

- Ethernet driver
- Session management
- External synchronization: B003 and B123 IRIG-B formats are now accepted
- General Remote alarm
- Transmission time measurement (*)
- SNMP: some bugs solved and new traps added
- IPIT and IEPT alarms indication corrected
- PWEB available

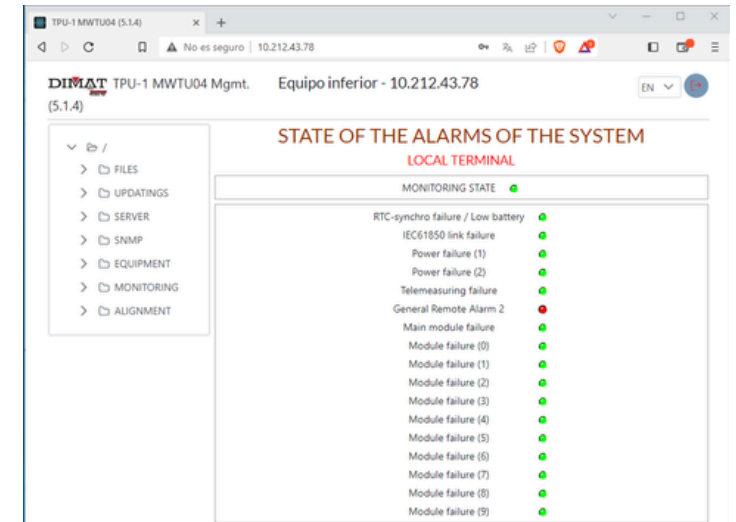
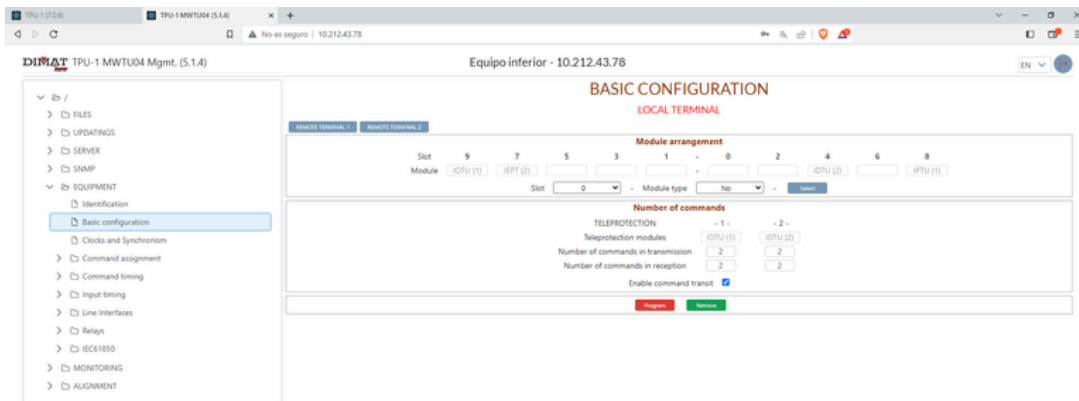
(*) Except for IOCT and IPIT



NEW WEB MANAGEMENT

React: Non-Java based WEB management

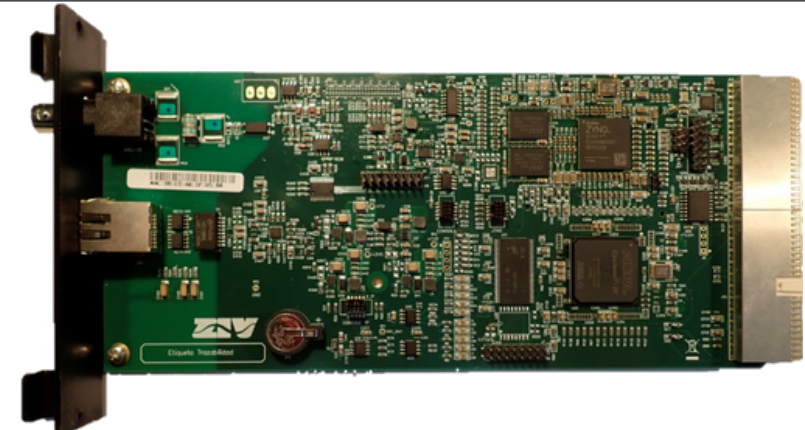
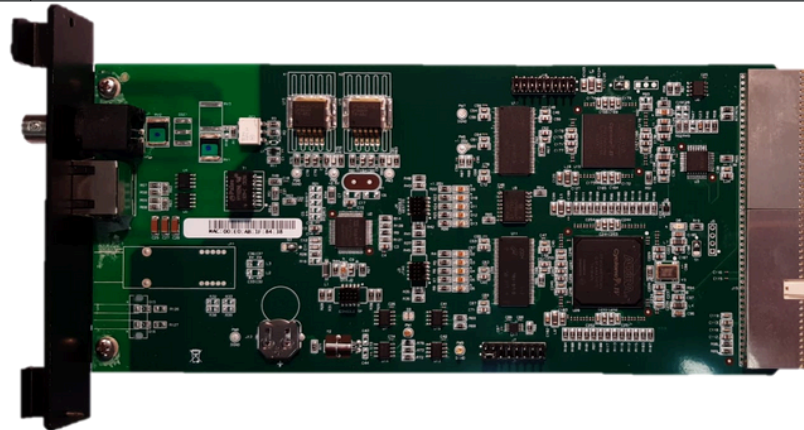
- New management WEB pages in HTML5 and Java Script
- Java plugin not requested anymore
- Update from 3.9 version to React Ver_x.x can be carried out by the user (*)
- PWEB not available



(*) Once upgraded to React the module can only be downgraded to 3.9 version in factory

MWTU VERSIONS

Main and	MWTU.02 (4.x)	MWTU.02 (5.x)
TPRO processor	ALTERA Cyclone IV (328 IOs)	
Main and Ethernet processor	ALTERA Cyclone IV (179 IOs)	XILINX Zinq XC7Z010 (Dual Core ARM Cortex-A9)
Management interface	Ethernet 10/100BaseTX	
Chronological register	4000 alarms and events (1ms resolution)	
SNMP agent	✓	✓
SNTP	✓	✓
IEC 61850	Only GOOSE messages	Complete IEC 61850 server
Cybersecurity	✗	✓



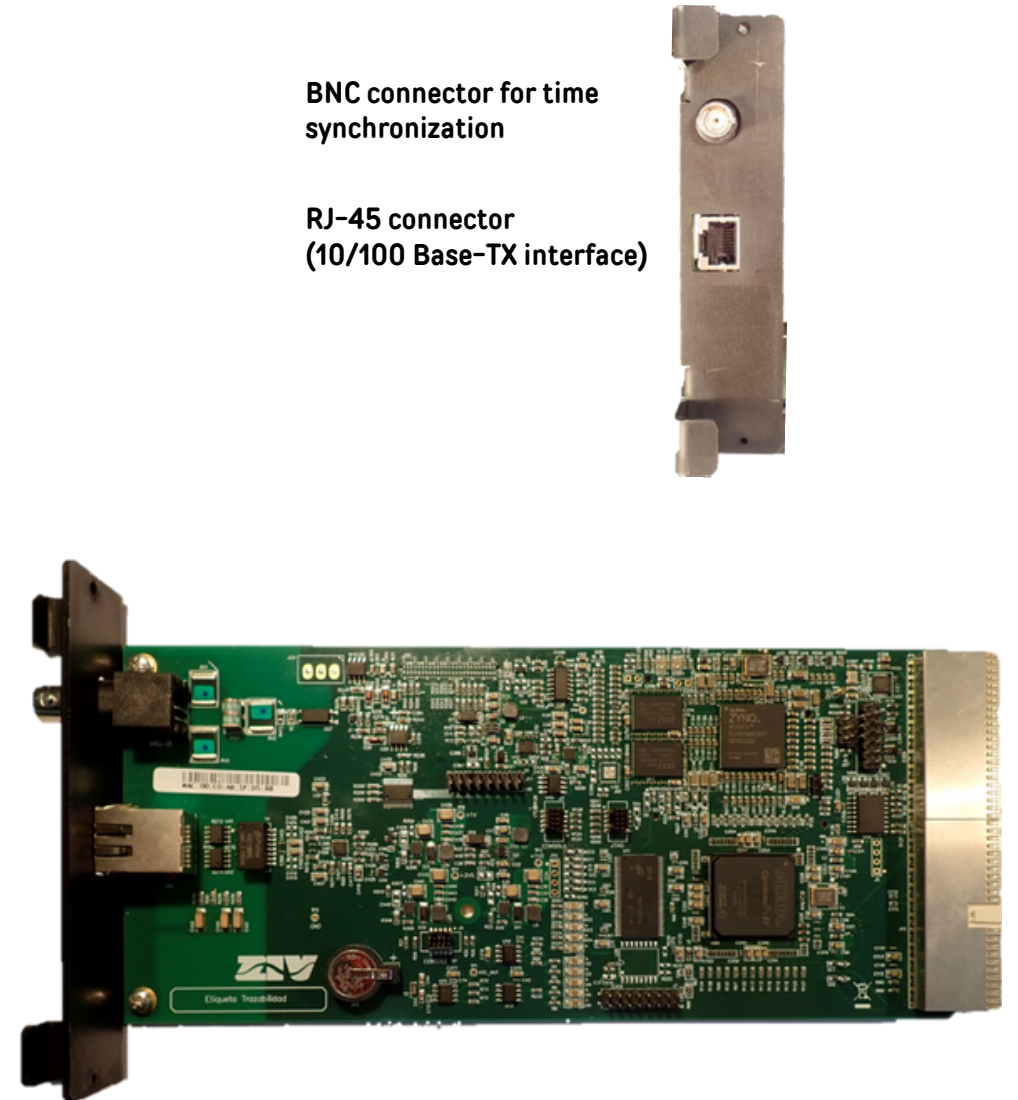
MWTU.02 (5.x) MODULE

New features in MWTU.02 (6.x) version

All from of the MWTU.02 (4.x) module plus:

- Cybersecurity
- IEC 61850 optional submodule
- Management of IOCS module
- Uploading fast transfer mode
- Inputs, outputs and line Alias
- Local time on the display
- Customizable identifier text on main page

Note: PWEB is not available in this version due to cybersecurity reasons



Cybersecurity

Inclusion on the new MWTU.02 (6.x) module of:

- HTTPS
- Password and User modification LOGs
- Only one management session at once

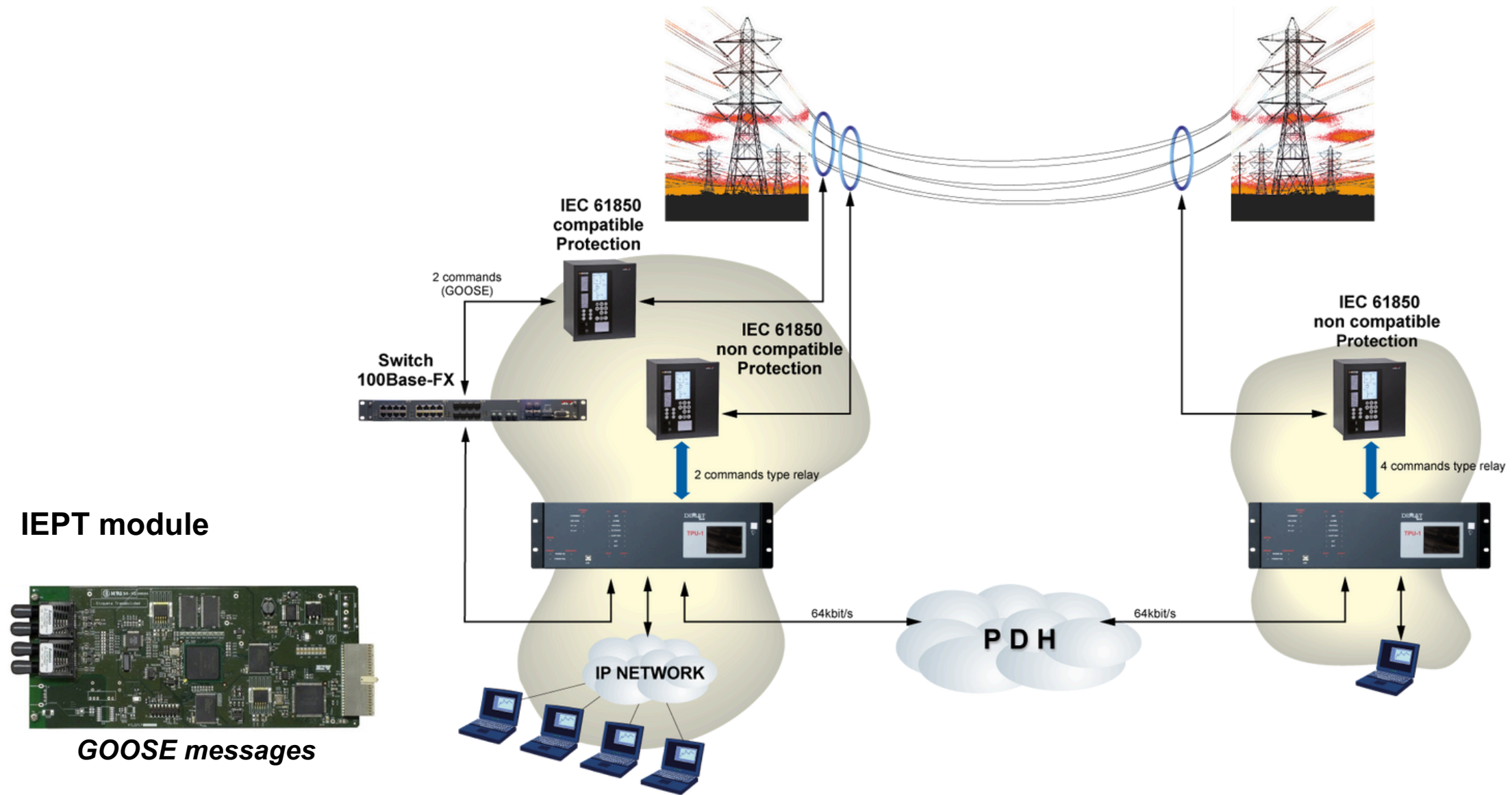
Future developments:

- Role Based Access Control (RBAC)
- Independent security LOG

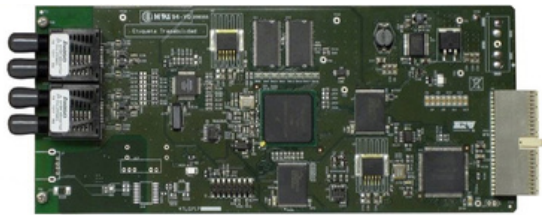


Features based on IEEE 1686, IEC 62351 and NERC-CIP

IEC 61850 COMPATIBILITY



IEPT module



GOOSE messages

KWTU SUBMODULE

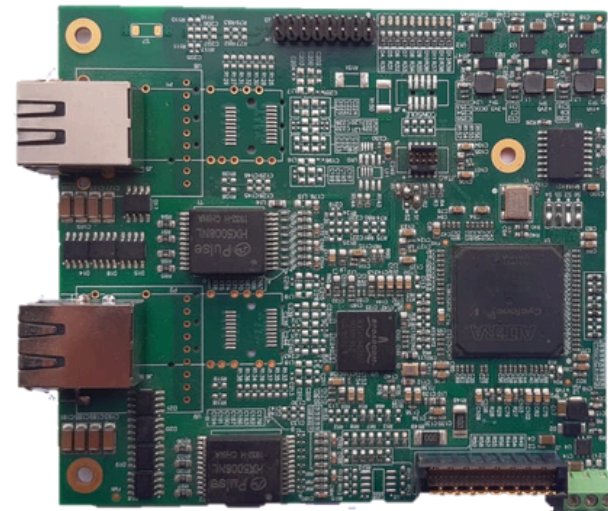
IEC 61850 Ed2

Development of the KWTU daughterboard for the new MWTU module supporting a complete IEC 61850 Ed2 server:

- GOOSE
- BRCB and URCB
- ICD file
- Configuration through CID file

Available interfaces:

- SFP
- RJ-45



KWTU



IEC 61850
Interface 2

RJ-45 connector
(10/100 Base-TX interface)

IEC 61850
Interface 1

MWTU + KWTU front
plate

Note: More Flash memory required for managing the IEC 61850 server

MWTU.03

(1.x)



HSR, PRP, PTP

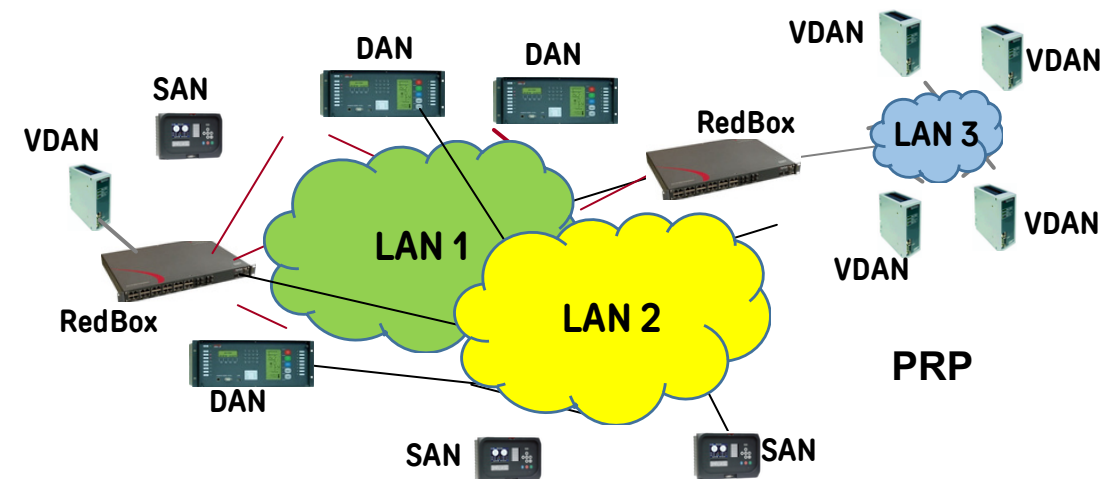
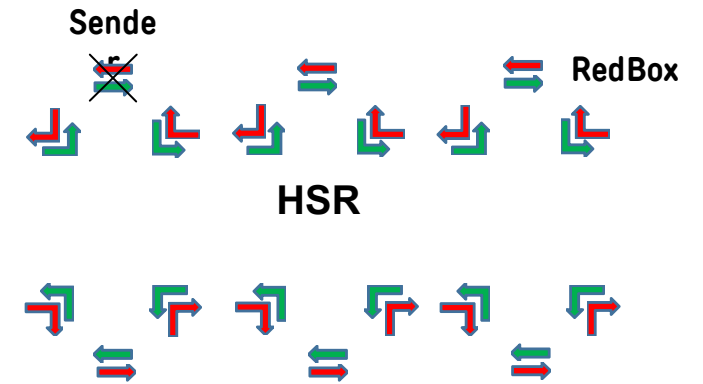
Inclusion on the new MWTU.03 (1.x) with KWTU daughterboard of:

- HSR – High availability Seamless Redundancy protocol
- PRP – Parallel Redundancy Protocol
- PTP – Precision Time Protocol (IEEE 1588)

HSR, PRP, PTP

Inclusion on the new MWTU.03 (1.x) with KWTU daughterboard of:

- HSR – High availability Seamless Redundancy protocol
- PRP – Parallel Redundancy Protocol
- PTP – Precision Time Protocol (IEEE 1588)



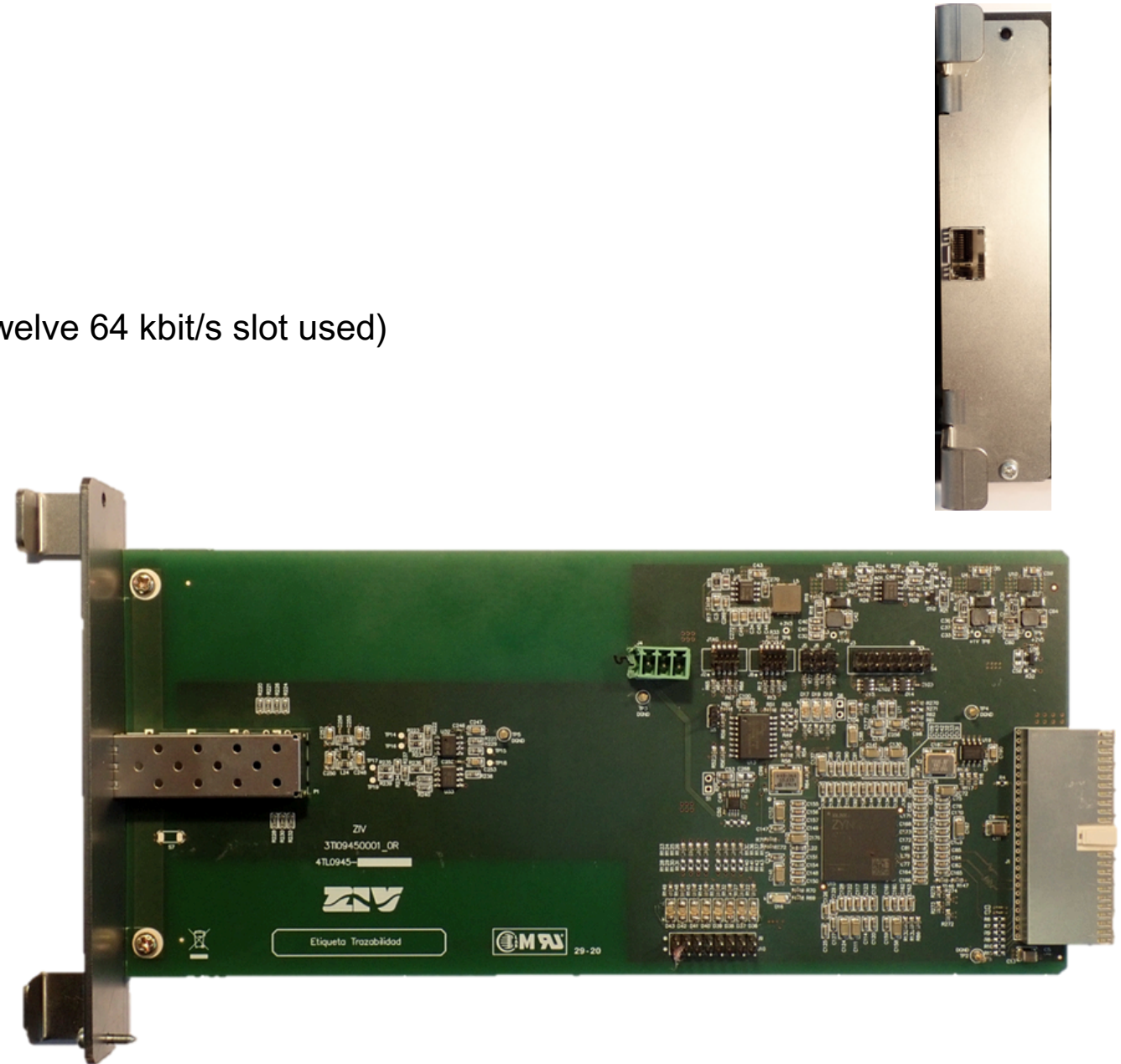
IOCS MODULE

IOCS: Interfaz Óptico C.37.94 SFP

- According to IEC C.37.94 standard
- Digital Communications at 2 Mbit/s over optical fiber (twelve 64 kbit/s slot used)
- SFP interface
- DDM (Digital Diagnostic Monitoring)
- Available SFPs:

I (nm)	L (km)
850	2
1310	60
1550	120

Note: only supported by MWTU.02 (6.x) and MWTU.03 (1.x)



C37.94 frame

2 Mbit/s (256 bit/frame)

Header: 16 bits

a, b, c, d, e, f, g, h: alternate pattern to ensure compliance with G.704

Pattern 1: a b c d e f g h = 1 0 0 1 1 0 1 1

Pattern 2: a b c d e f g h = 1 1 y 1 1 1 1 1

y = Yellow Alarm bit

= 0 for normal;

= 1 if receiving bad signal (LOS declared)

Overhead: 48 bits

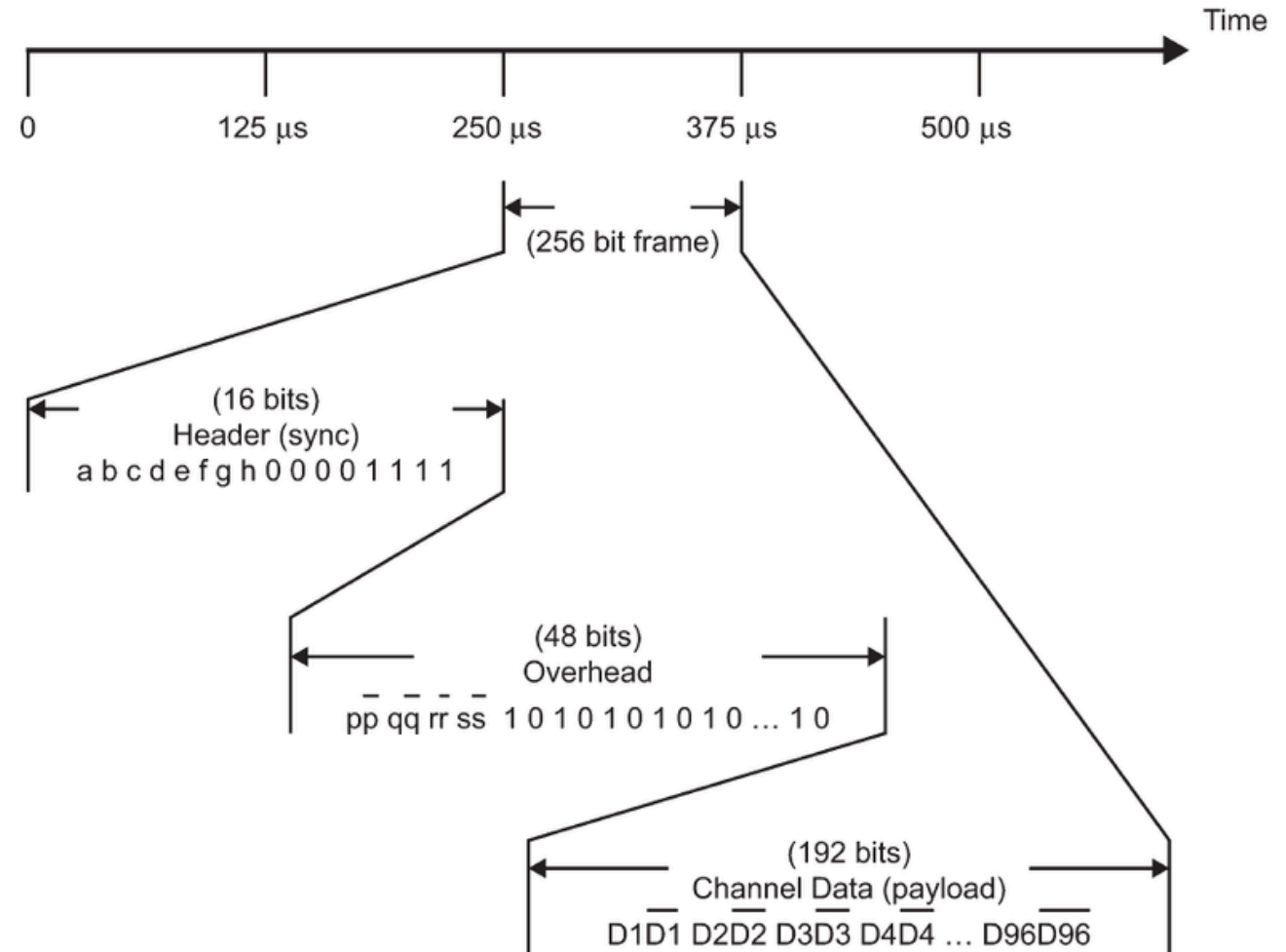
p, q, r, s: number of user slots used (1 to 12)

Payload

24 bytes (192 bits)

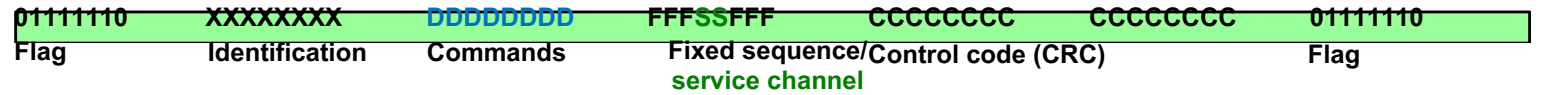
Each bit is transmitted together with its negate: DxDx

up to 12 bytes available for the user



Frame structure

Standard TPU-1 frame



Byte	Hex	Use
1	XXXXXXXX	Identification
2	XXXXXXXX	
3	DDDDDDDD	Commands
4	DDDDDDDD	
5	KKKKKKKK	Internal channel
6	FFFXFFF	Fixed sequency
7	RRRRRRRR	Reserved
8	RRRRRRRR	Reserved
9	CCCCCCCC	Control Code (CRC)
10	CCCCCCCC	
11	CCCCCCCC	
12	CCCCCCCC	



65536 different codes

No CIS required



Possibility of up to 16 commands (future)



Internal channel @ 64 kbit/s



Internal use



2 bytes reserved for future applications

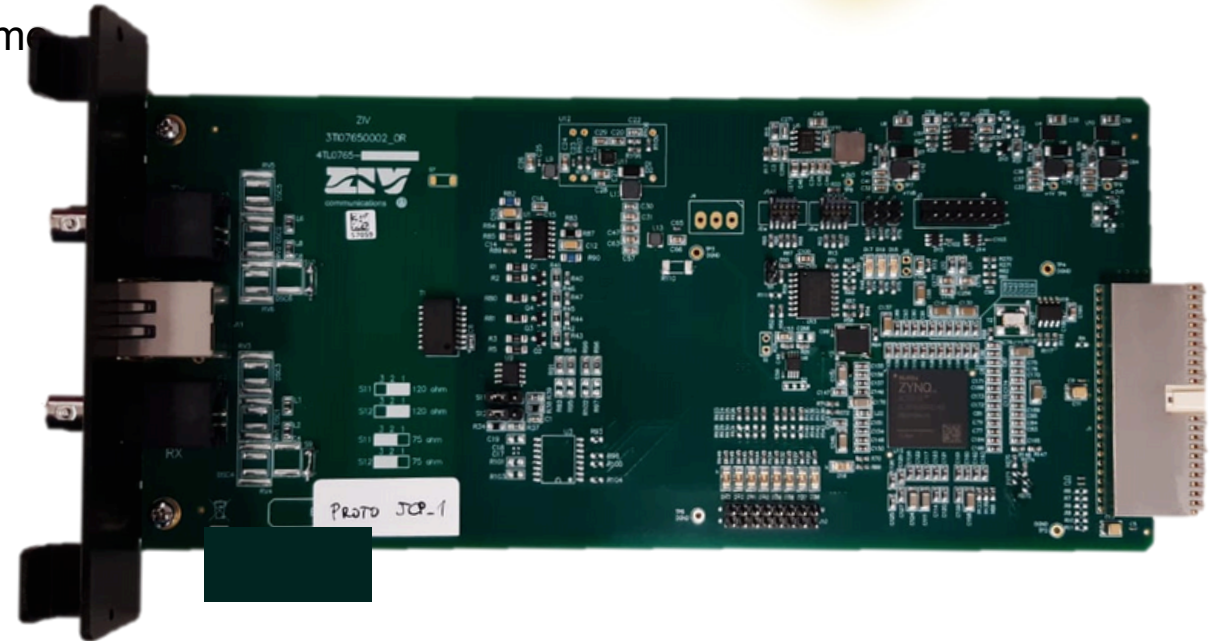
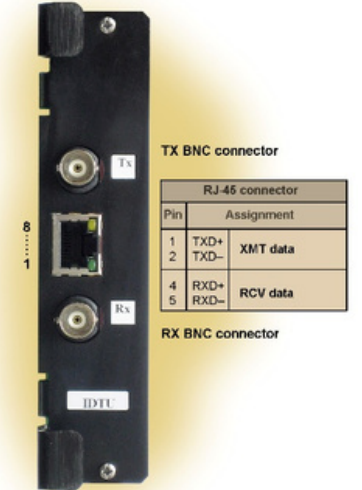


32-bit CRC

IDTU.00 (5.0) MODULE

IDTU module (Interfaz Digital Teleprotección Universal):

- A unique Zinq FPGA used
- Same characteristics and features than the former version:
 - 2.048 Mbit/s (G.703) digital
 - Use of one to five 64 kbit/s slots of the 2 Mbit/s frame
 - BNC (75 Ohm) and RJ-45 (120 Ohm) connectors
 - Internal or recovered clock
 - Interface selection by jumper
- HW ready for future features



IETU.00 (4.0) MODULE

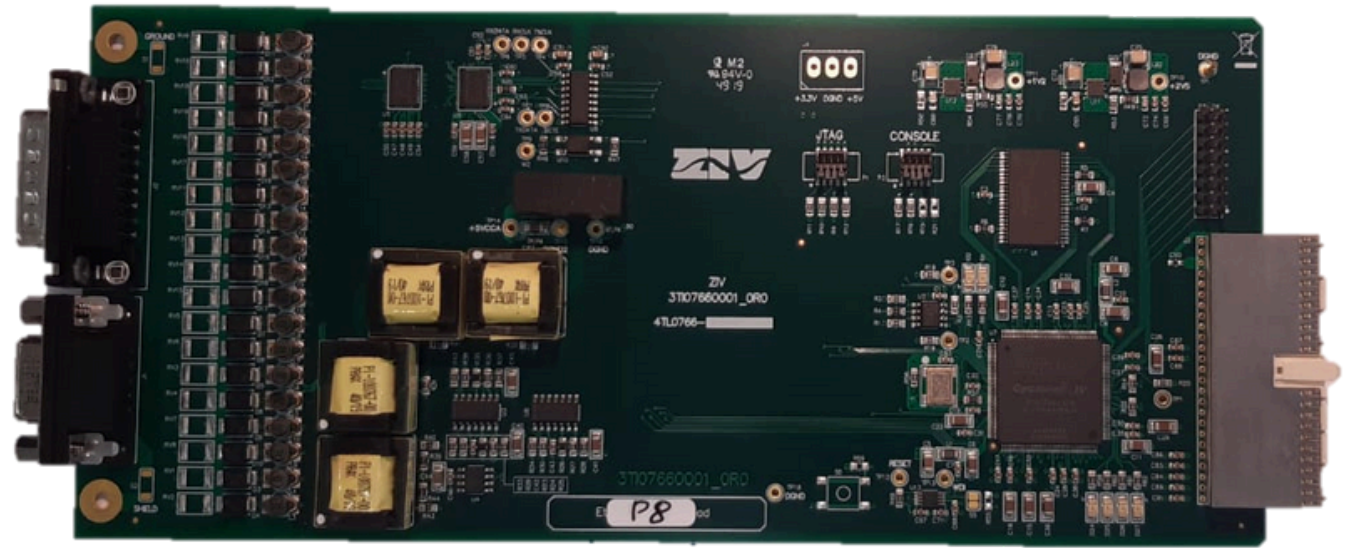
IETU: Interfaz Eléctrico Teleprotección Universal

- New HW
- Same characteristics and features than the former version
- Two connectors to avoid the interface switching

V.35 / V.11



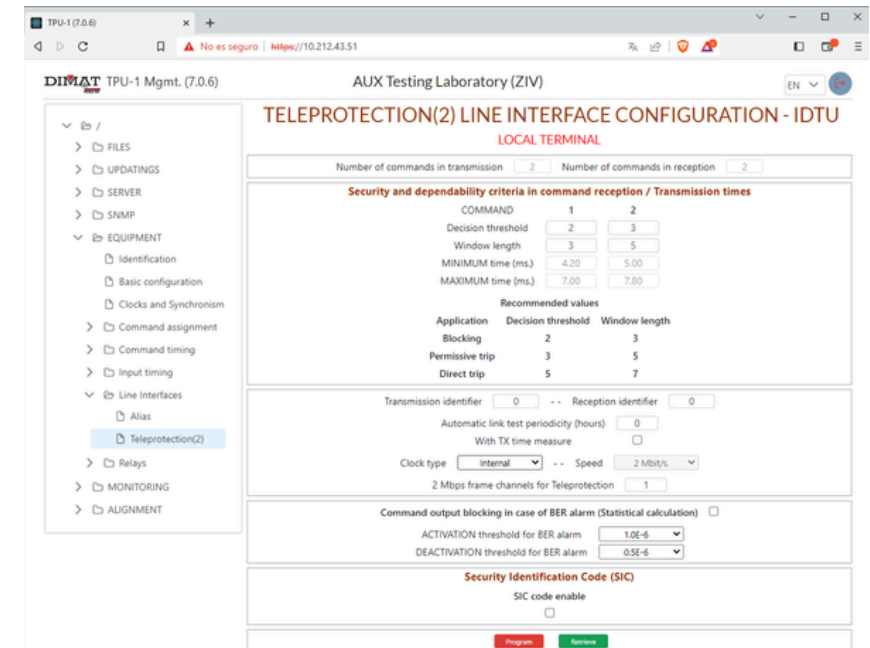
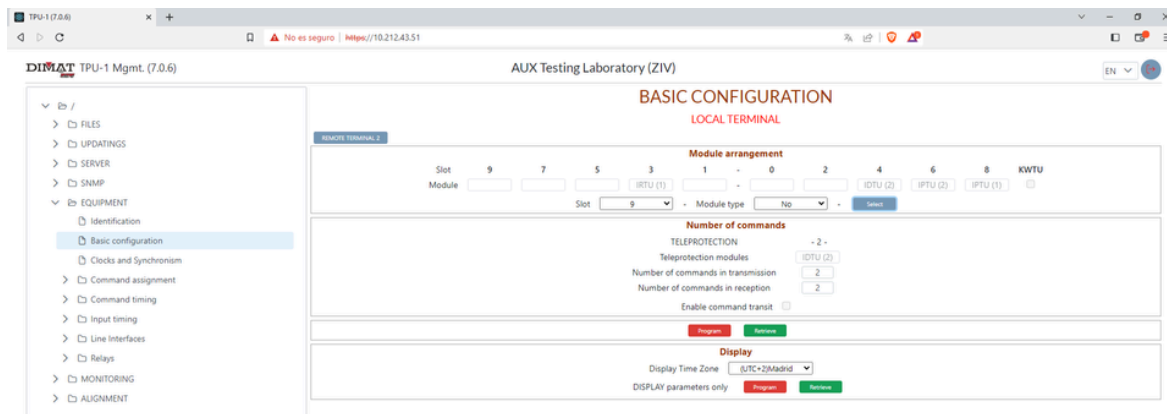
G.703



WEB MANAGEMENT

Non-Java based WEB management

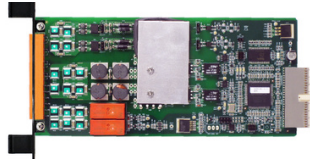
- Management WEB pages in HTML5 and Java Script
- Java plugin not requested



AVAILABLE MODULES

User interfaces

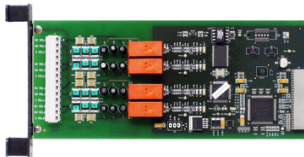
IPTU.00
2 x I/O + 2 relays



IEPT.xx
GOOSE interface



IRTU.0x
2 or 4 relays



Common modules



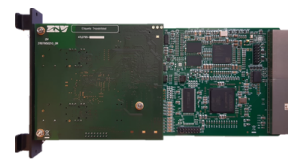
MWTU.02 (4.x)
Management module

- Java or non-Java management



MWTU.02 (5.x)
Management module

- Cybersecurity
- Non-Java management



MWTU.03 + KWTU
Management module

- Cybersecurity
- 61850 server
- Non-Java management

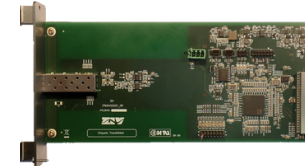


ATPU.0x
48Vdc power supply
110-220 Vac/dc power supply

Line interfaces



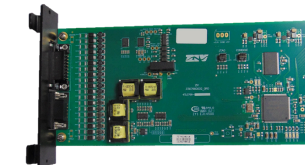
IPIT.xx
Ethernet interface



IOCS.00
FO SFP C37.94 interface
(+ IOTU and IOCT)



IDTU.00
2 Mbit/s G.703 interface



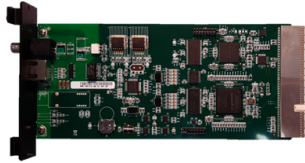
IETU.00
64 kbit/s interface



IBTU.00
4W analog interface

MANAGEMENT VERSIONS

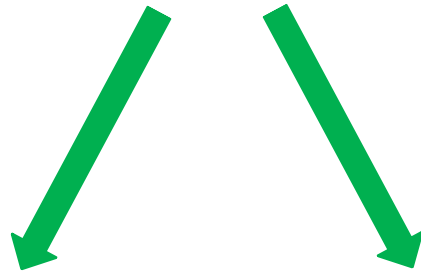
TPU-1R



MWTU.02 (4.x)

Present management module supplied till now in the TPU-1R

Upgradable to:

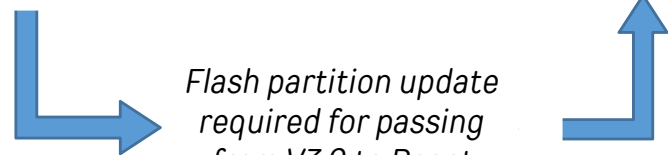


Ver.3.9

Java management
Currently in Production

React Ver.x.x

Non-Java management
Currently under final tests



Flash partition update required for passing from V3.9 to React

Different SW and FW files



MWTU.02 (5.x)

New management with:

- Cybersecurity
- Non-Java management



React Ver.0.x

Non-Java management
Currently under final tests

Different SW and FW files



New TPU



MWTU.03 + KWTU

New management with:

- More Flash memory
- Cybersecurity
- Non-Java management
- 61850 server



React Ver.y.x

Non-Java management
Currently under final tests

MODULES COMPATIBILITY

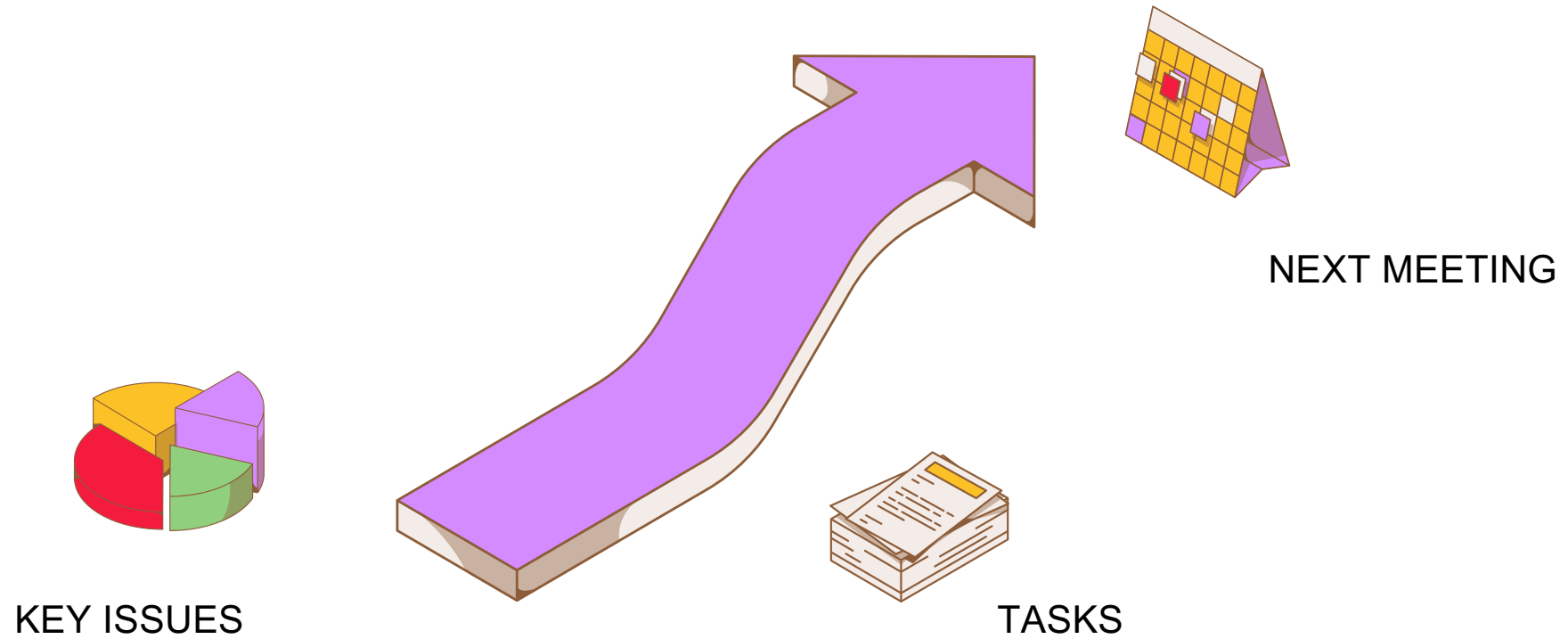
TPU-1R

Enhanced TPU

	MWTU.02 (4.x)		MWTU.02 (5.x)	MWTU.03+KWTU
	Ver. 3.9	React	React	React
IPIT.xx	✓	✓	✓	✓
IDTU.00 (3.1)	✓	✓	✓	✓
IDTU.00 (4.0)	✓	✓	✓	✓
IDTU.00 (5.0)	✗	✓	✓	✓
IETU.00 (3.0)	✓	✓	✓	✓
IETU.00 (4.0)	✓	✓	✓	✓
IOCS.00	✗	✗	✓	✓
IOTU.0x	✓	✓	✓	✓
IOCT.0x	✓	✓	✓	✓
IBTU.00	✓	✓	✓	✓
IPTU.00	✓	✓	✓	✓
IEPT.xx	✓	✓	✓	✗
IRTU.0x	✓	✓	✓	✓
DSTU	✓	✓	✓	✓
MCTU	✓	✓	✓	✓

Next step

Let`s spend 10 min together to identify



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Contact us now for further information
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Factory Tour