

# Digital EHV Line Monitoring and Teleprotection



Uninterrupted power supply is critical to a country's economic and social development. Power utilities require flexible, future-proof communication systems to cope with changing operational requirements, philosophies and technologies. Having a reliable power system with advanced monitoring and protection mechanisms is significantly vital. Drawing from its vast experience in supplying telecommunications solutions, TTC TELEKOMUNIKACE is able to provide a robust communication infrastructure based on its PCM30U-OCH multiplexer in

order to effectively monitor and protect power systems over a small or large geographical area. Our modular solutions range from the simple stand-alone multifunction unit to a fully integrated system, enabling the desired protection functionality to be easily configured and adapted to any specific layout of the power transmission and distribution networks. The PCM30U-OCH is also a fully configurable multiplexer capable of handling voice, data and video over various transmission mediums such as optical fibres, microwave radio (PDH and SDH) or Power-Line Carrier (PLC).

## Main characteristics of a PCM30U-OCH solution

- Cost-effective multiservice support
- Provides rapid fault localization to avoid service disruption
- Reduces network complexity while enhancing efficiency
- Cost savings via a flexible architecture

## Flexibility

- Can be configured as a stand-alone multifunction unit or fully integrated into existing infrastructures
- Utilises standards-compliant designs to help preserve existing network investments

## Reliability

- Fault detection and high-availability improve network reliability
- Designed for guaranteed immunity against electromagnetic interferences

## Uniqueness

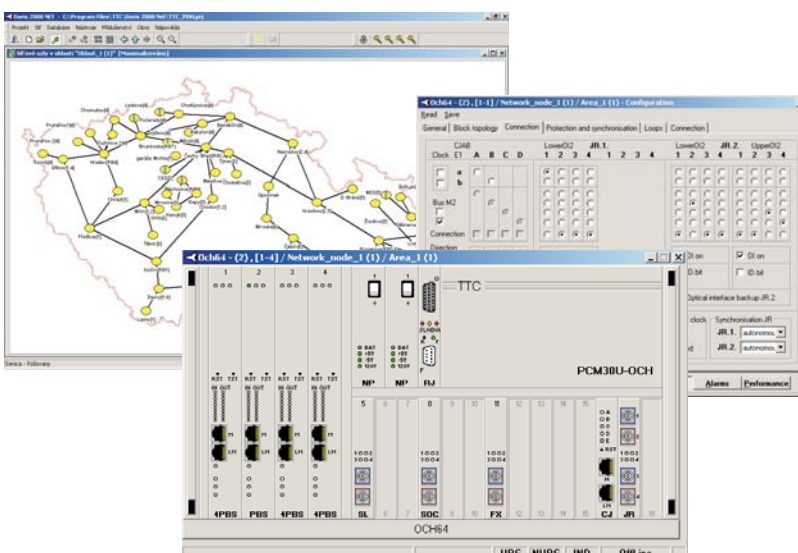
- Multi-services support enables new service deployments
- Transmission of frequency samples and actual phase value (for phase-locking purposes)

## Compatibility

- Fully compatible with various third-party digital and analogue protection systems (e.g. Siemens, ABB, SEL, etc.)

## Sophisticated Network Management System

- Centralized, secure and remote network administration simplifying operations
- Provides fast and accurate detection and diagnosis of affected devices and services



The PCM30U-OCH is a compact, yet highly-scalable multi-services platform that can help you deploy new services, such as TDM, voice, IP Transport, Ethernet Switching to any network node over a single transport medium, a less costly alternative to operating several separate networks. This system is designed to provide cost-efficient multi-service access for internal or external applications where high performance and reliability are required. It is engineered to help you bring new services to market faster and more cost-effectively than ever before. The PCM30U-OCH is part of the TTC TELEKOMUNIKACE comprehensive portfolio, providing end-to-end solutions for today's electricity

networks. Its main benefits to a utility operator are:

- Reduces capital investment by helping eliminate overlay networks.
- Offers smooth migration from existing applications to packet-based ones, thus enabling growth to a more diverse range of services, whilst at the same time helping lower expenses.
- Provides seamless integration and inter-working capabilities with various third party protection mechanisms already deployed in existing infrastructures.
- Supports LAN-to-LAN Ethernet connectivity using optional sm@rtMUX or OMS technology.

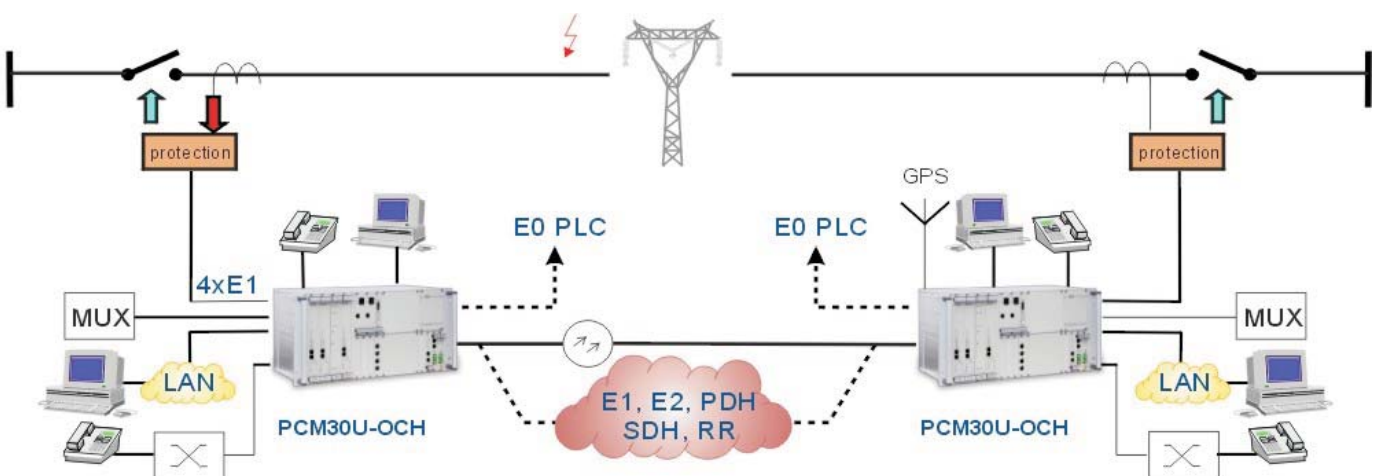
## Network Management

Doris 2000, a Windows-based system, provides element management functions for the PCM30U-OCH and its associated components. It can help you reduce the complexity of your operations through remote and centralized administration of all supported network elements, with operational functions that include configuration management, fault management, performance management and security management.

## Applications

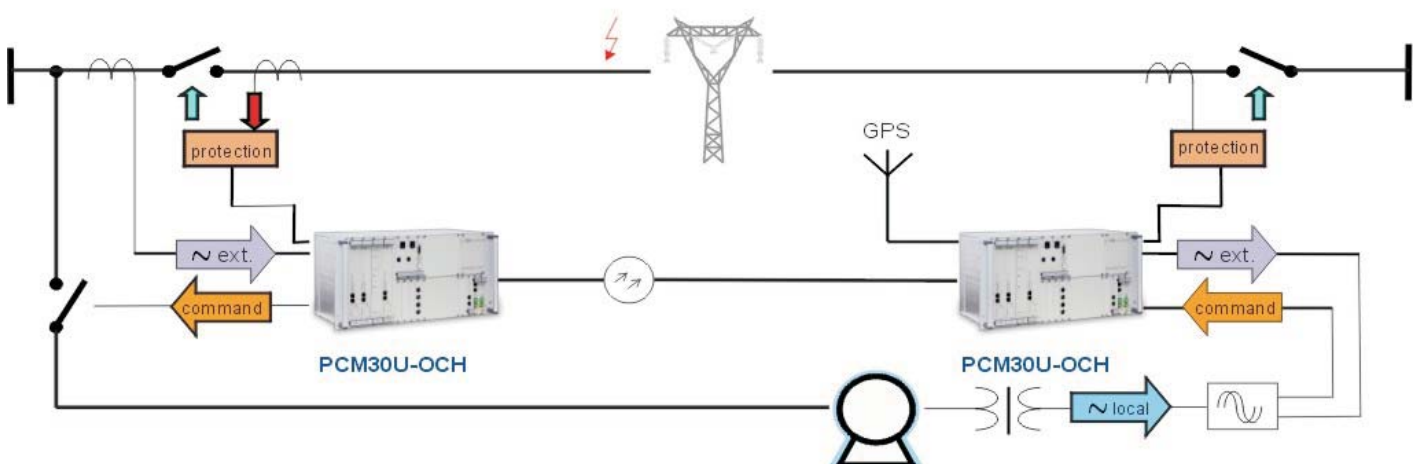
### Multifunctionality

The PCM30U-OCH is a flexible system that can be used as a terminal multiplexer. It can support small or large applications in backbone networks, addressing current and future needs efficiently and cost-effectively. It is capable of supporting a variety of applications whilst keeping your network flexible, cost-effective, and easy to maintain.



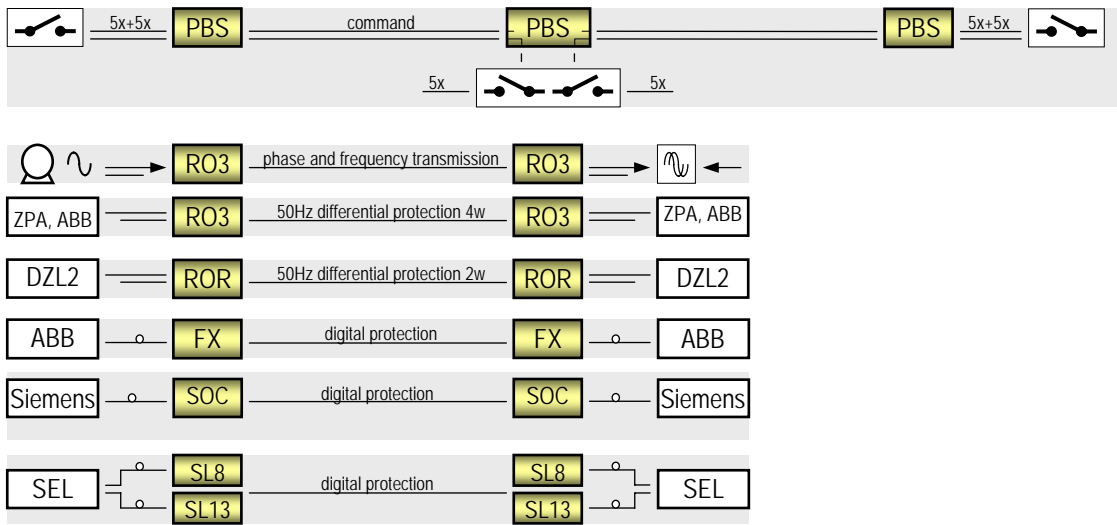
### 50 Hz transmission

One of the unique features of PCM30U-OCH is its ability to transmit the actual phase value, thus allowing the operator to maintain a desired phase-locking position.

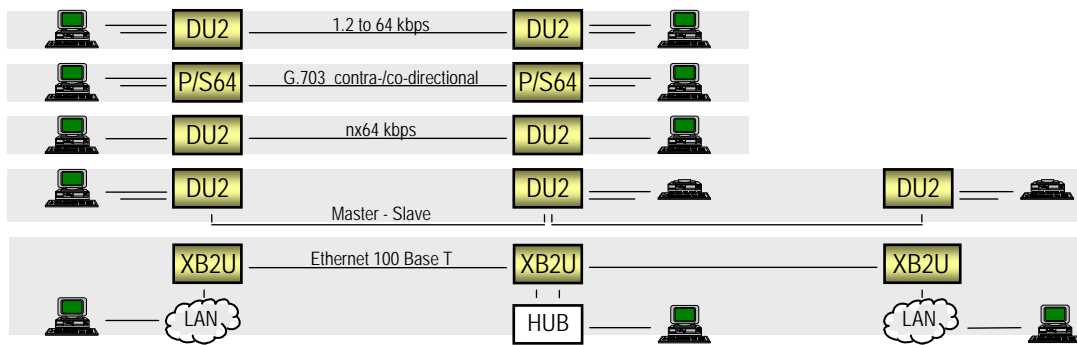


# Interface Overview

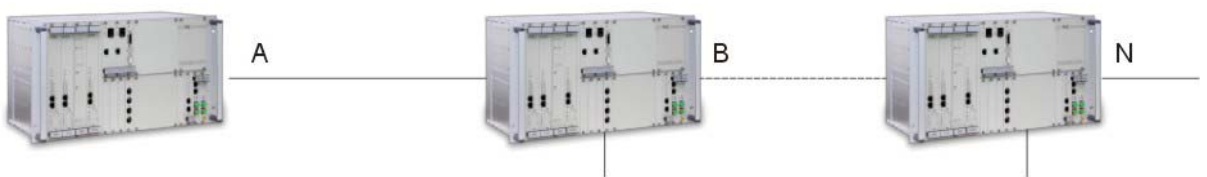
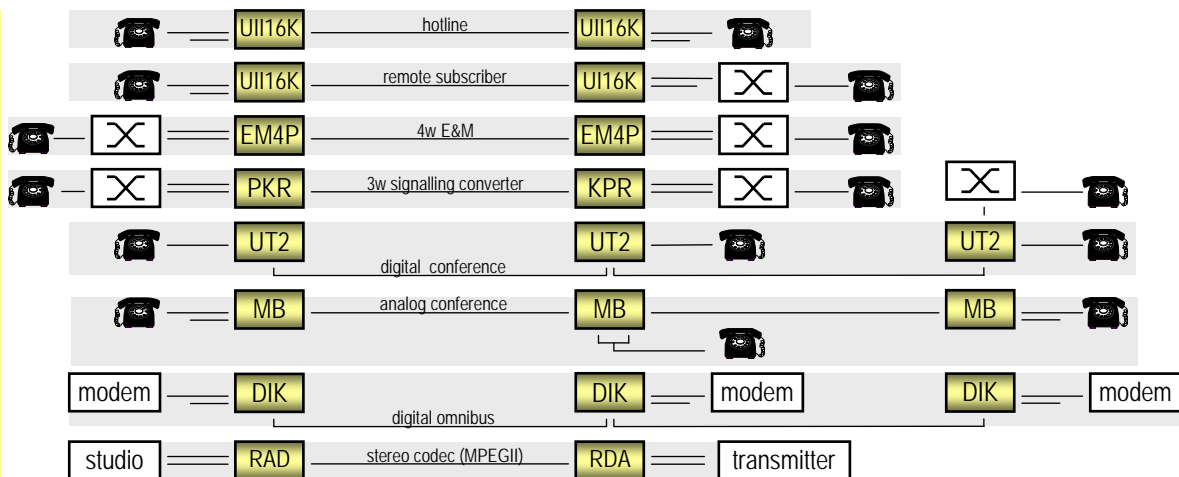
protections



data



voice



<b>Technical Specifications</b>			
<b>Muldex and 2 Mbps Interface Parameters</b>		<b>8 Mbps Interface Parameters</b>	
Frame composition	G.703, G704	Transmission rate	8448 kbps
Performance monitoring	G.706 (CRC-4), G.821	Impulse shape	G.703
Aggregate signal interface	G.703, HDB3	Attenuation at 4224 kHz	min. 6 dB
Number of 2 Mbps interfaces	4	Nominal impedance	75 Ω asymmetrical
Synchronization	autonomous, external and from 2 Mbps or 64 kbps port (G.703 CODIR)	Jitter, interference and over-voltage resistance	G.823, G.703.
<b>Line Interface Parameters</b>			
<b>OLT1/OLT2 interfaces</b>			
Transmission rates	4096/16,896 kbps	Wavelength range	1310 nm                      1550 nm
Transmission medium	2 SM/MM fibers (G.652/G.651)	Span attenuation	39 dB                      50 dB
Optical source	laser	Range incl. system security	100 km                      230 km
Optical connectors	FC/PC	Code type	MCFMI
Battery backup real time clock with GPS synchronization			
<b>User Interface Parameters</b>			
<b>Interface for phase and frequency transmission</b>		<b>Optical interface for digital relays 820 nm/1310 nm</b>	
50 Hz 4w differential relay	DL910	7SD511, 7SD512 differential relays	Range 2 km/820 nm min. Transmission rate 19.2 kbps
50 Hz 2w differential relay	DZL2	7SD523, 7SD61 differential relays	Range 2 km/820 nm min., Rates of 64-128-256-512 kbps
Input voltage to 2 kΩ impedance	70 V <sub>ac</sub> max.	REL316, REL551 digital relays	bit rates 2Mbps – frame conform to FOX standard
Output voltage to 2 kΩ/1.2 kΩ impedance	87 V <sub>ac</sub> max.	SEL311L digital relay	820/1310 nm range up to 100 km/1310 nm IEEE PC37.94
Phase setting	0 to 15.75°		
<b>Command transmission interface</b>			
Transfer of 10 trips + 1 discrepancy input		<b>Outputs</b>	
Min. trip transmission time	1.5 to 3 ms according transmission rate 64 to 256 kHz	4 electromechanical switches + 6 electronic switches optionally random outputs incl. b-contacts	
Command log with 1 ms accuracy (GPS synchronization)		Loading of contacts max.	
Sent commands counter	unit display (0 to 999)		switching voltage/dc                      resistive load                      inductive load
Unit identification	management system DORIS	outputs 1 to 4	5 to 280 V                      4 A                      4 A
<b>Inputs</b>	10+1 isolated by optical modules	outputs 5 to 10	5 to 280 V                      1 A                      1 A
Insulating voltage of optical parts	> 4 kV	electronic failure relay	5 to 280 V                      1 A                      1 A
Nominal voltage DC	24, 48, 110 a 220 V	mechanical failure relay	24 to 280 V                      4 to 0.3 A                      1.2 to 0.06A
Input current (typical)	inputs 1 – 4                      inputs 5-11	insulation voltage of trip and failure contacts	
on decision level	11.8 mA                      1.6 mA	contacts relay/earth                      > 4 kV	
on nominate input voltage	2.9 mA                      2.6 mA	disconnected relay contacts                      280 V (limited by switch protection)	
Threshold	0.6 to 0.75 of nominate voltage	failure relays	
Parameters may be changed according demands		1 electromechanical switch                      optional switching/disconnecting jumpers	
<b>Options</b>		1 electronic switch                      optional switching/disconnecting jumpers	
E1 external modem		sub-module of optical terminations ORL1, ORL2	
sub-module of line interface 64 kbps, synchronous data transmission		sub-module of electrical terminations E1	
2 ohmic-splitted co-directional interfaces G.703			
<b>Data interfaces</b>			
Data channel multiplexing	X30 or V.110	<b>Analogue interfaces</b>	
Data channel interfaces	RS232, RS422, RS485, V.35, V.36, X.21, RS530, 300 bps to 64 kbps	Z (AUT), UB, MB, E&M, 2/4w multipoint for dispatcher circuits C2 (3w signaling converter)	
Types and bit rates of data channels	Synchr. or asynchr. up to 64 kbps, Nx64 kbps, N = 2, 4, 8, 16	<b>General Specifications</b>	
Additional digital interfaces	64 kbps codir./contradir. optical 820 nm 300 bps to 64 kbps	Supply voltage	36 to 72 V <sub>dc</sub> , 110 to 220 V <sub>dc</sub> , 230 V <sub>ac</sub>
		Power consumption	20 W typical
		Dimensions (H x W x D)	268 x 483 x 250 mm
		Operational conditions	ETS 300 019-1-3, class 3.1
		Temperature range, EMC	+5 to +55 °C, EN 55 022, EN 61 000