

High precision time server, grandmaster and PRC

DTS 4160.grandmaster

The DTS 4160.grandmaster is a combined time distribution and synchronization device with up to 4 network ports (IPv4/IPv6). With its high-precision and intelligent concept for redundant operation, it offers a high degree of reliability and availability.

Your benefits using DTS 4160.grandmaster:

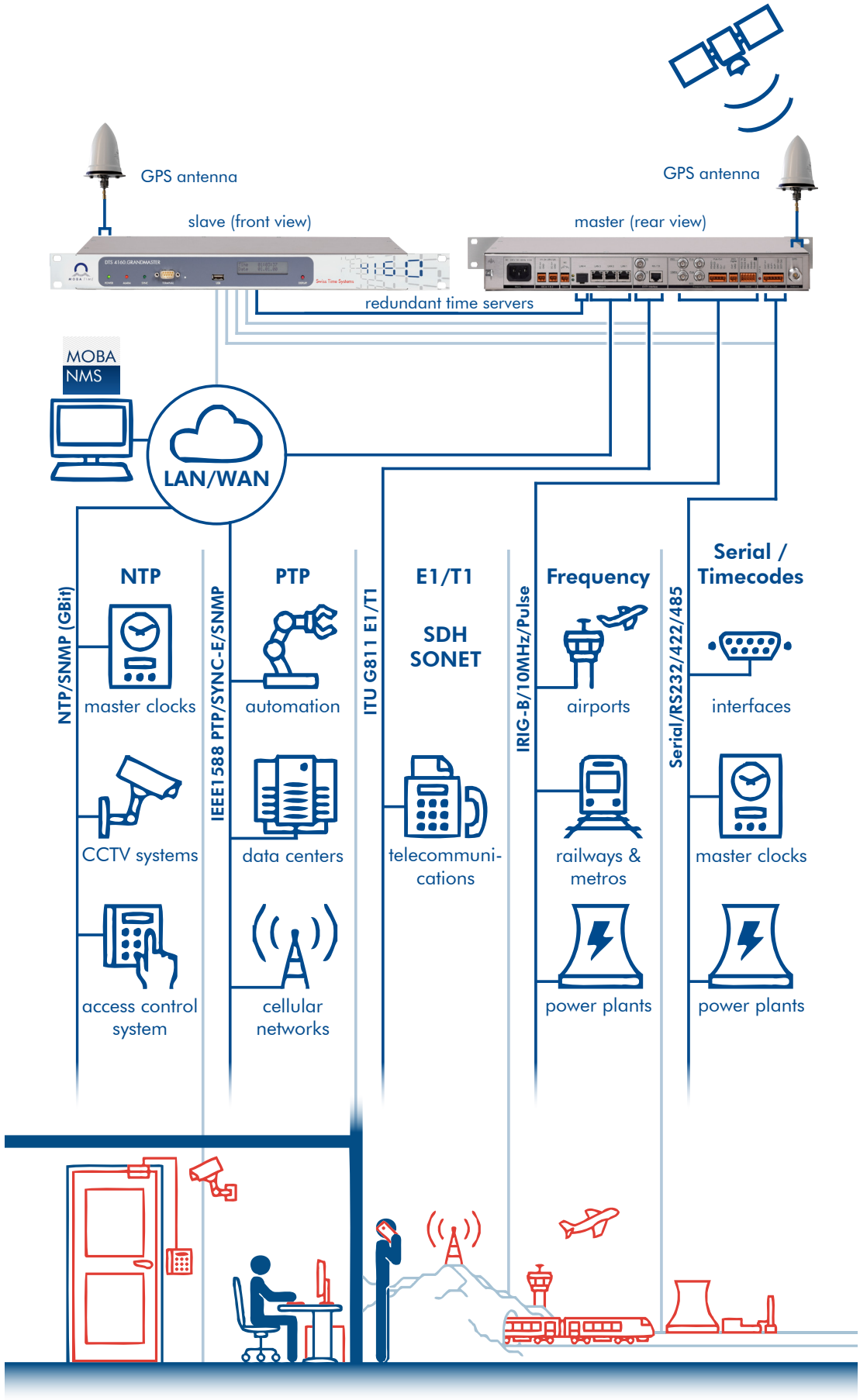
- 4 completely separated LAN ports (3x RJ45, 1x SFP):
  - provides PTP on 3 ports
    - 1- and 2-step master
    - different profiles and domains per port
    - multicast/unicast
    - IPv4/IPv6/Layer 2
  - provides NTP on 4 ports (>10'000 requests/s on all 4 ports combined)
- Multi-purpose device due to the different time code and frequency outputs:
  - 1x E1
  - 1x 10MHz
  - 1x pulse/frequency output
  - 1x IRIG-B
  - 2x serial output
  - 1x DCF
- High degree of system redundancy by connecting two DTS 4160 via fiber-optic link:
  - high availability
  - master-slave operation with automatic switch over in case of an error
- High precision time:
  - Time reception from GPS, GLONASS or Beidou
  - Rubidium oscillator for holdover (option)

DTS 4160.grandmaster - Technical details

General specifications				
	System	CPU	ARM Cortex dual core	
		Oscillator	Rubidium or OCXO	see oscillator option
	Housing	19", 1 HU	✓	
	Display	LCD, 2 lines, for status and time info	✓	
	LAN interfaces	100/1000 MBit, RJ45	3	3 maintenance ports
		SFP (miniGBIC interface)	1	May be used for: - redundant operation (see redundant link) - Optical network for NTP/PTP
	Redundant link	For redundant operation of 2 corresponding DTS 4160 with master/slave negotiation	✓	Option to additional network port. See also LAN interfaces miniGBIC/SFP
	RS 232 interface	For operation control, D-Sub 9 connector	1	
	USB interface	For firmware update	1	
	Power supply	Redundant power supply (supplies 1, 2 and 3)	✓	
		Supply 1 (standard mains connector for 240VAC)	240VAC	
		Optional supply 1 with screw terminals for 240VAC/110VDC	240VAC or 110VDC	function not yet available*
		Supplies 2 & 3	22..29 VDC	
	Ambient temperature	at 10-90% relative humidity, without condensation	0 to 50°C	
Reference signal inputs				
		GPS RF input (for GPS Antenna, N female connector) to internal GPS receiver; GPS, GLONASS*, Beidou* included 72 channels, tracking sensitivity -165 dBm	1	*future option
		Optical link from second DTS 4160.grandmaster (SFP)	1	
Reference signal outputs				
	Network	NTP server	>10'000req/s	on all 4 ports combined
		PTP Grandmaster (E2E, P2P, 1-step, 2-step, Unicast, Multicast, Layer 2, IPv4/IPv6)	RJ45 over 2 Gbit ports SFP over 1 Gbit ports	
		PTP profiles	default, utility	Optional: telecom
		SyncE	1 as "holdover redundancy"	
	Others	IRIG-B	1 precision output, 50 Ohms	BNC (AM) spring terminal (DC)
		Precision pulse/frequency/DCF output on RS422 and CL	1	
		Serial outputs with configurable time telegrams (10 pin terminal block)	2 RS 232/422/485 RS 422: output only	
		E1 / 2.048MHz, G811, G.812, G813 compatible no protected output (1:1), no SSM, 4x BNC, 4x RJ48	1	RJ48 (balanced) BNC (unbalanced)
		DCF 77 CL (Current loop) passive output (2 pin terminal)	1	
Network interface				
		100/1000BaseT	3	
		SFP for miniGBIC module 100/1000Base-T(X) or FX	1	
Network services				
		PTP master IEEE1588-2008 (V2) 1 or 2-step	✓	2x RJ45 1x SFP
		SyncE master	✓	
		NTP V4 (V3 compatible) server	✓	
		NTP mode Server, Peer, Broadcast, Multicast	✓	
		SNTP	✓	
		MD5 authentication for NTP	✓	
		TIME, DAYTIME	✓	
		Telnet, SSH, FTP, SCP, SFTP - disengageable	✓	maintenance ports only
		SNMP Notifications (Traps)	V2c/V3	maintenance ports only
		SNMP Get, Put	V1/V2c/V3	maintenance ports only
		IP V6 support	✓	
		Link Aggregation (IEEE 802.3 ad)	✓	4x over 2 interfaces
		VLAN	✓	

IP configuration			
IPv4	DHCP	✓	
	static IP	✓	
IPv6	Autoconfiguration	✓	
	static IP	✓	
	DHCPv6	✓	
Alarm I/O			
Electrical	Output: Relay contact	✓	
Network	Output: SNMP notifications (traps)	V2c/V3	maintenance ports only
	Output: Mail	✓	maintenance ports only
	Supervision possible with MOBA-NMS EXPERT (DSS)	✓	maintenance ports only
Oscillator			
different options: (long term stability)	OCXO $1*10^{-8}$	Option a	G.813, G.812 IV**
	OCXO $1*10^{-10}$	Option b	G.812 Type: all**
	Rubidium $3*10^{-11}$	Option c	G.811**
	Hold over (after >24h synchronization) @ constant ambient temperature	according oscillator	for rubidium 1 week
Accuracy			
GPS RF input, internal module	GPS to NTP	typ. < +/- 100µs	
	GPS to PTP	typ. < +/- 0.25µs	
	GPS to DCF	typ. < +/- 5µs	
	GPS to Pulse	typ. < +/- 5µs	
	GPS to IRIG (analog)	typ. < +/- 200µs	
	GPS to IRIG (digital)	typ. < +/- 1µs	
	GPS to serial output	typ. < +/- 10ms (jitter >10ms)	
Redundant link	Master to slave (redundant operation)	typ. < +/- 0.25µs	GPS receiver required for each device
Operation control			
	MOBA-NMS	✓	maintenance ports only
	Telnet	✓	maintenance ports only
	SSH	✓	maintenance ports only
	SNMP (V2c/V3 get, put)	✓	maintenance ports only
	RS 232 (PC-Terminal)	✓	
	LED Alarm	✓	
	LED Power	✓	
	LED Sync	✓	
Compliancy			
	EMC: EN 50121-4, 61000-6-4, EN 61000-6-2	✓	
	Safety: IEC 60950-1	✓	
	CB	✓	
	G.703	compatible	
	G.811, G.812, G.813	compatible	depending on oscillator option
	IEEE 1588-2008	✓	
	NTP RFC	✓	
	IEC 61850	✓	applicable for SNTP/NTP/ PTP synchronization only

DTS 4160.grandmaster - Application example



DTS 4160.grandmaster - Redundant operation

Redundant time

To avoid time deviation between two DTS 4160.grandmasters, they can be linked via a fiber-optic connection by using two GBIC modules. Both timecenters use a GPS source as primary time reference.

The two grandmasters automatically negotiate their state as master or slave. The slave is synchronized by the master in case of a failure of the synchronization source (GPS). Swap between master and slave state will occur automatic.

Redundant outputs

When synchronizing over the link, the "master" DTS time server has the better NTP stratum level than the slave.

The slave PTP Grandmaster is in passive mode.

Frequency and time code outputs are generated on both devices all the time.

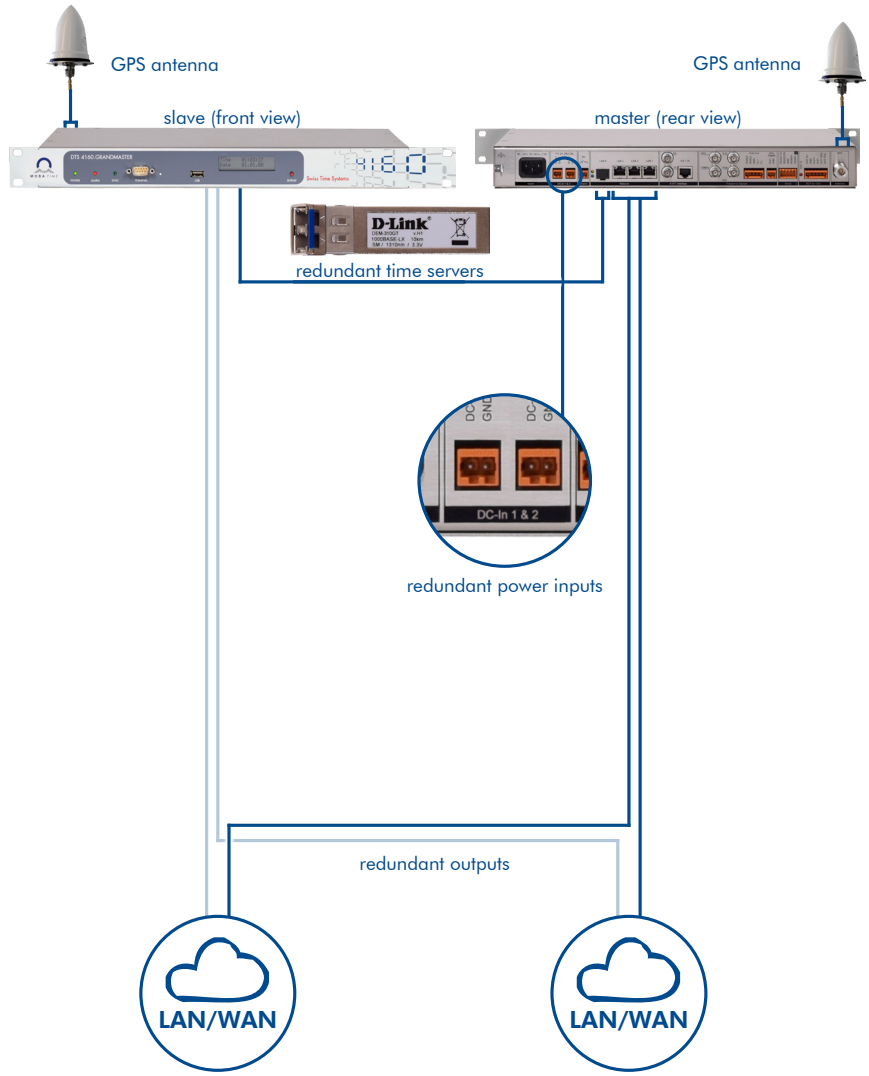
Redundant serial telegrams, DCF, 1PPS and IRIG-B can be achieved by the external change over unit (ECO).

Redundant power

The DTS 4160.grandmaster has three monitored inputs for entirely redundant power supply. The standby power supply input is also monitored.

Possible power variants:

- 24 VDC, non-redundant
- 24 VDC + 24 VDC, redundant
- 230 VAC + 24 VDC, redundant
- 230 VAC, non-redundant



DTS 4160.grandmaster - Features

Time precision
Utmost accuracy is achieved with GPS synchronization. An intelligent time management ensures lasting high accuracy by continuously compensating oscillator drift and aging.
The internal time is adjusted to the time reference (e.g. GPS) in one step or slowly shifted (in adjustable micro steps) to avoid any time leaps (e.g. after a longer loss of the time source).

Top performance for large networks
The high performance DTS 4160.grandmaster can reply to more than 10'000 NTP and SNTP requests per second, which allows for the synchronization of several thousand clients.

PTP Grandmaster
PTP according to IEEE 1588-2008 for the synchronization of highly accurate clients. Usable for telecom (e.g. LTE), energy (e.g. smart grid), automation, ...

NTP authentication
The DTS 4160 supports NTP authentication for increased security, which allows the clients to verify the source of the received NTP packets.

Safe and convenient operation
Operation over LAN via MOBA-NMS (SNMP), SSH or SNMP protocols is possible. SSH and SNMP (MD5 authentication and DES for encryption) enable a secured connection. Additional connection over RS232 is possible.

Alarm indication
Alarms are reported via SNMP messages, e-mail or by alarm relay.
Additionally, the alarm is indicated on the display and on the Alarm LED.



▲ Front view
- Serial Terminal for operation (RS232)
- USB connector for software update, file upload and maintenance
- Status LEDs for power, alarm and synchronization
- Display to show time, date, status, alarm, IP address..



▲ Rear view
- Power: 1x mains power connector, 2x DC power supply input
- alarm relay contact
- Synch. outputs
  - 1x E1, DCF, IRIG-B, pulse output
  - 2x serial RS 232 / RS 422 / RS 485 interface
- LAN connectors
  - 3x RJ45 100/1000MBit
  - 1x SFP
- GPS antenna connector (N female)

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