Net.Time φ

Net.Time φ is a PTP/NTP over PRP clock designed to facilitate the integration of conventional substations with the new IEC 61850 standards by offering a wide variety of time reference inputs and outputs including PTP, NTP, PRP, ToD, PPS, IRIG-B, DCF77, SyncE, MHz, T1/E1. It can be equipped with OCXO or Rubidium oscillator to improve timing in hold-over mode, the result is a rugged and fault tolerant solution to power, network and timing failures.

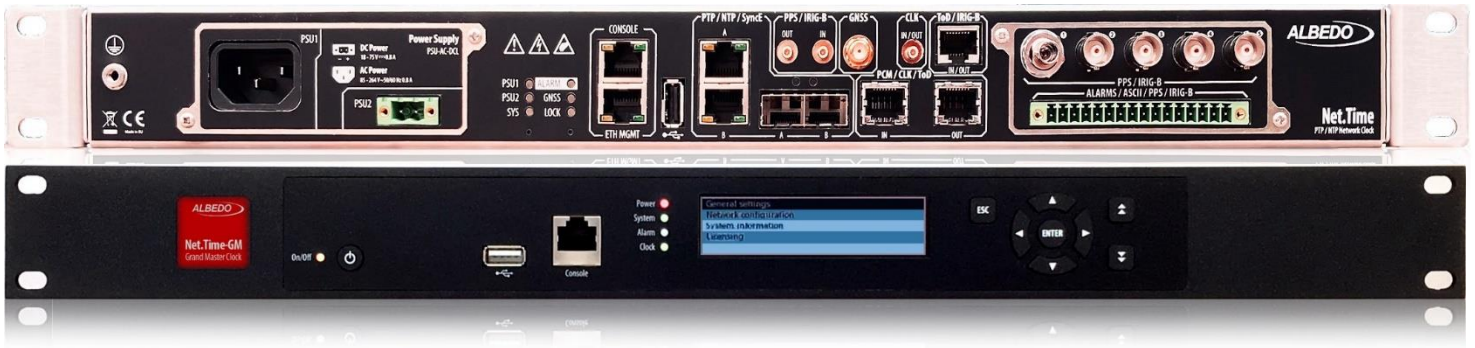
ALBEDO

Just in Time

ALBEDO: a **global** player of **telecom** appliances

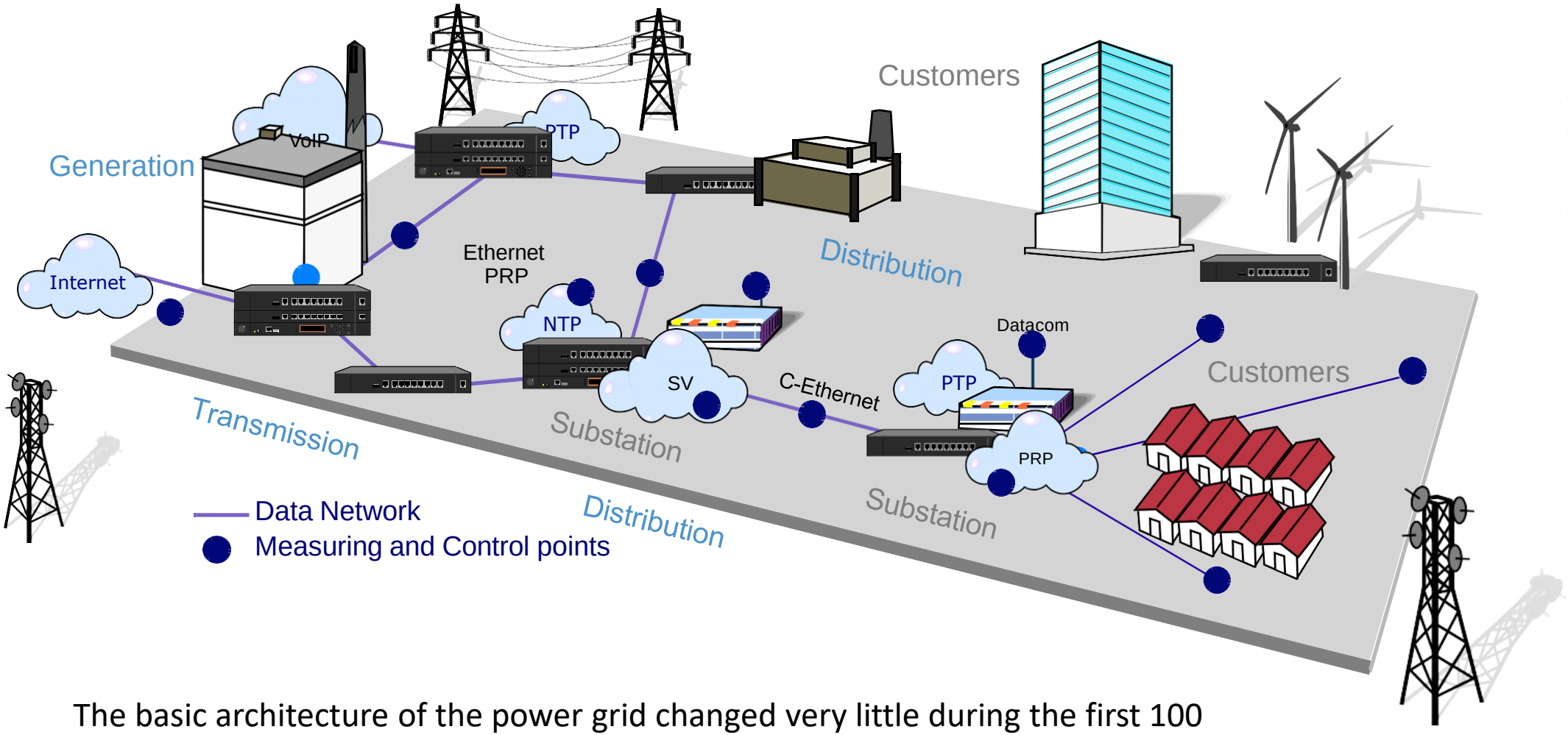
ICT electronics (1983)

Trend Comms (2001)



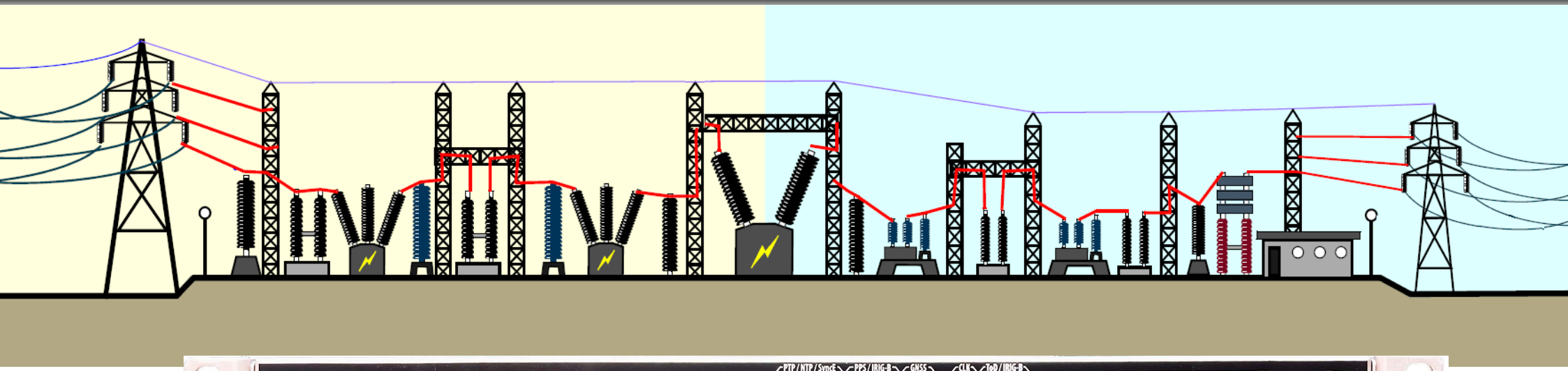
ALBEDO (2009-today)

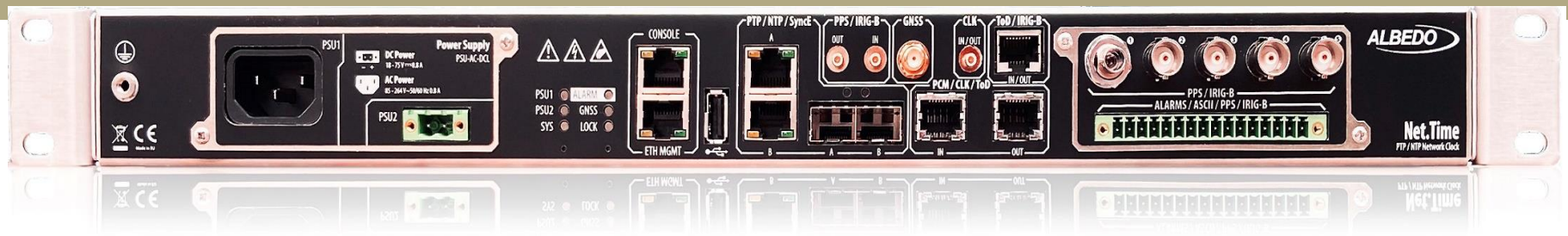
The new **Smart** Power Grid



The basic architecture of the power grid changed very little during the first 100 years. However, in the latest decades the concept of Smart Grid emerged thanks to the massive deployment of ICT technologies that have allowed a significant increase of the efficiency, resilience and quality of the power service.

About **Net.Time φ**





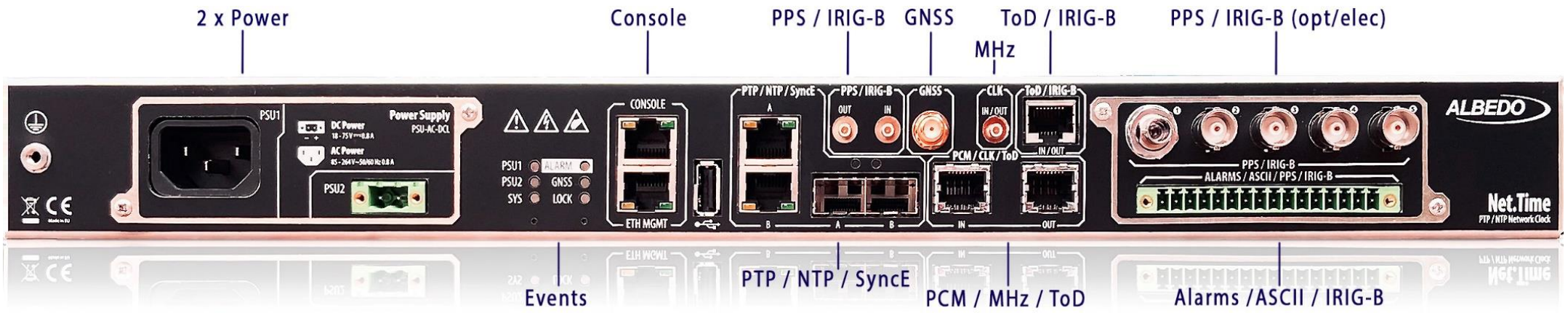
Net.Time φ is a PTP/NTP over PRP clock designed to facilitate the integration of conventional substations with the new IEC 61850 standards.

Net.Time φ offers seamless migration to IEC 65850 by offering a high variety of clock reference inputs that could be configured as primary or backup references facilitating the synchronization of heterogeneous and multivendor appliances supporting PTP, PRP, NTP, SyncE, PPS, ToD, IRIG-B, E1/T1, MHz or DCF77.

Net.Time φ **Applications**

- Substations based on IRIG-B willing to migrate to PTP
- IEC-61850 Substations based on PTP, NTP, PRP willing to integrate
- Heterogeneous Substations with a mess of time signals
- Railway companies that also have Power Substations

Net.Time φ **look** & **feel**



- 2 x 100Mb/s Optical & Electrical
- PTP power profile
- PTP and NTP over PRP
- Two combinable AC/DC sockets
- 6xLEDs (3xSystem + 3xTiming)
- 2xRJ45: Console and Remote Management
- USB port: update, data, results
- 2xSFP: 1 Gb/s in/out timing
- 2xRJ45: 1 Gb/s in/out timing
- 2xRJ48: in/out timing
- 3xSMB: in/out timing
- SMA: GNSS

Clock Performance

- OCXO default oscillator
- Rubidium optional oscillator

Locking time

Metric	OCXO	Rubidium
Locking time	< 5 minutes	< 4 hours

Performance locket 24h.

Metric	OCXO	Rubidium
GNSS	± 45 ns	± 40 ns
1PPS / ToD	± 10 ns	±10 ns

Performance in hold-over

Metric	OCXO	Rubidium
Phase within ±100 ns	-	10 hours
Phase within ±500 ns	2 hours	24 hours
Phase within ±1.0 µs	4 hours	48 hours
Phase within ±10.0 µs	24 hours	-

Net.Time φ is a **universal protocol translator**

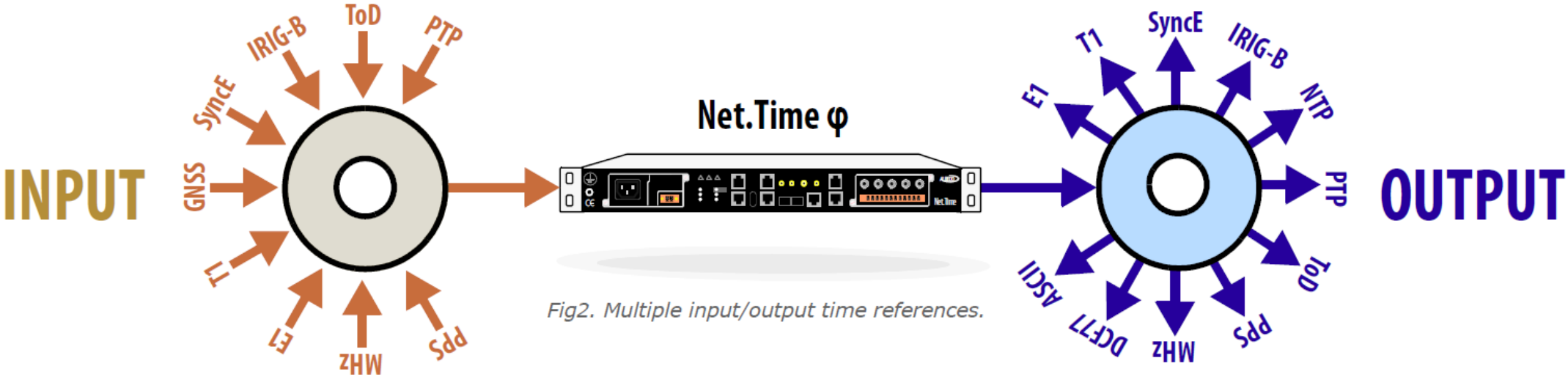


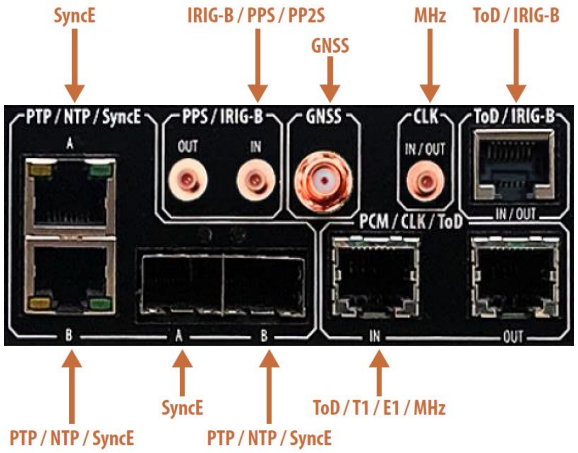
Fig2. Multiple input/output time references.

Net.Time is very flexible because it accepts multiple clock references to discipline the internal circuits. GNSS is the default and the most obvious reference but signals such as PTP, NTP, SyncE, ToD, IRIG-B even MHz, E1/T1 can also be used as back-up time references in case of failure of the first reference or in case of GNSS spoofing.

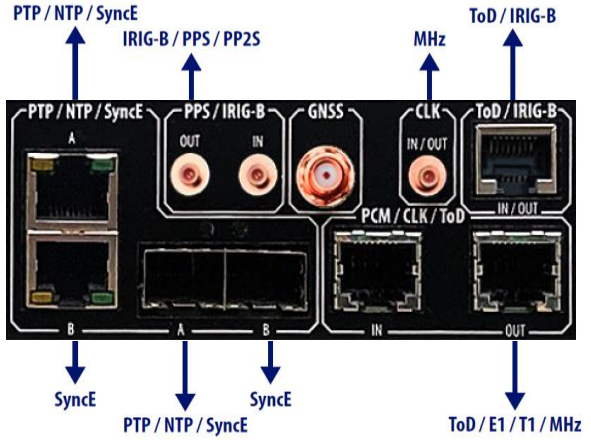
Everything will continue as before and whithout losing the phase or the time of output signals.

Timing signals: **Universal Protocol Translator**

clock reference inputs

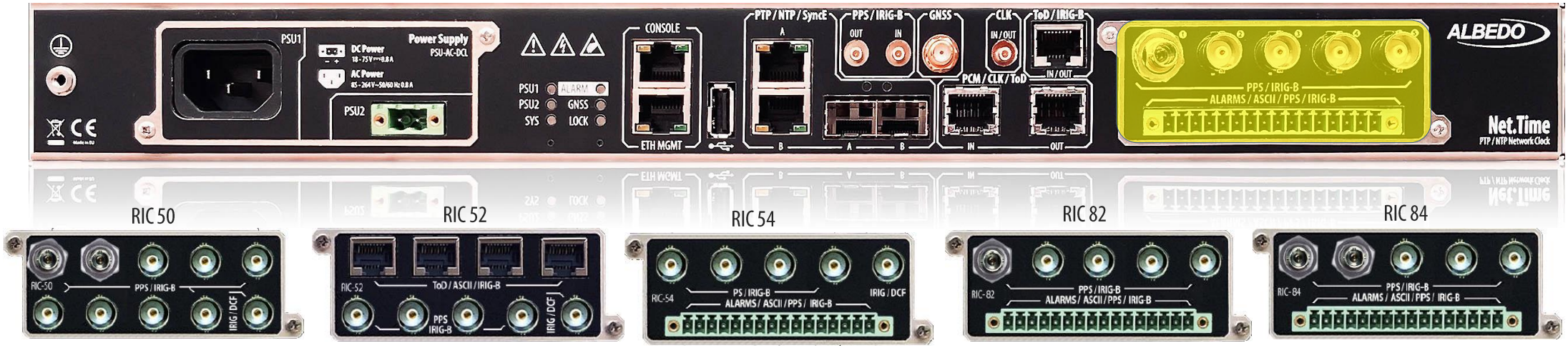


synchronization outputs



	GNSS	PTP	NTP	SyncE	ToD	IRIGB	PPS	T1/E1	MHz
RJ45 (A)		out	out	out					
SPF (A)		out	out	out					
RJ45 (B)		in/out	in/out	in/out					
SPF (B)		in/out	in/out	in/out					
RJ48 (C)					in			in	in
RJ48 (D)					out			out	out
SMB (E)						out	out		
SMB (F)						in	in		
SMA (G)	in								
SMB (H)									out
RJ48 (I)					in/out	in/out			

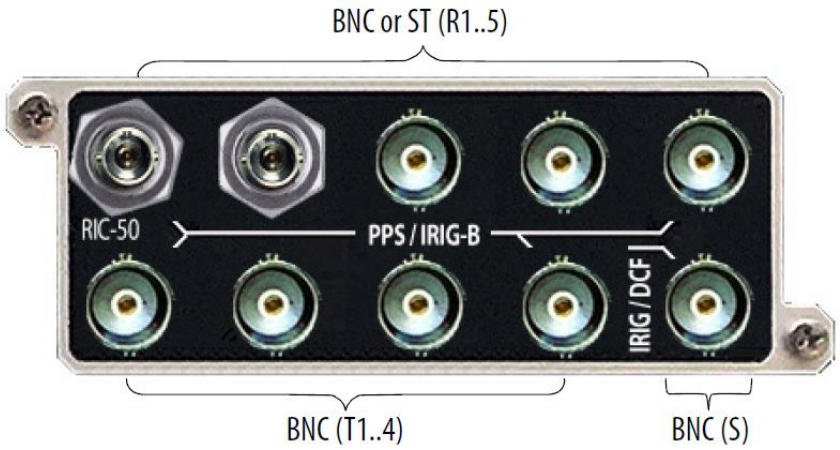
Net.Time φ **RIC Modules**



Variety of modules to satisfy most of industry timing requirements:

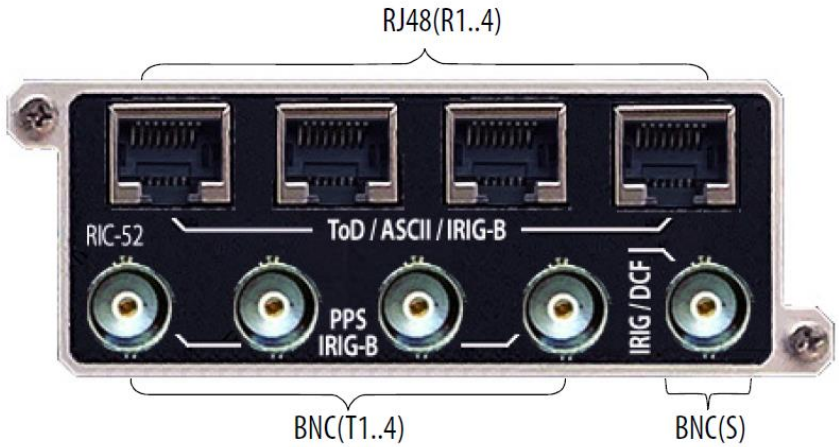
- N x PPS or PP2S
- N x ToD
- N x MHz
- N x IRIG-B (optical & electrical)
- N x DCF77
- N x ASCII
- NMEA
- Alarms

RIC 50



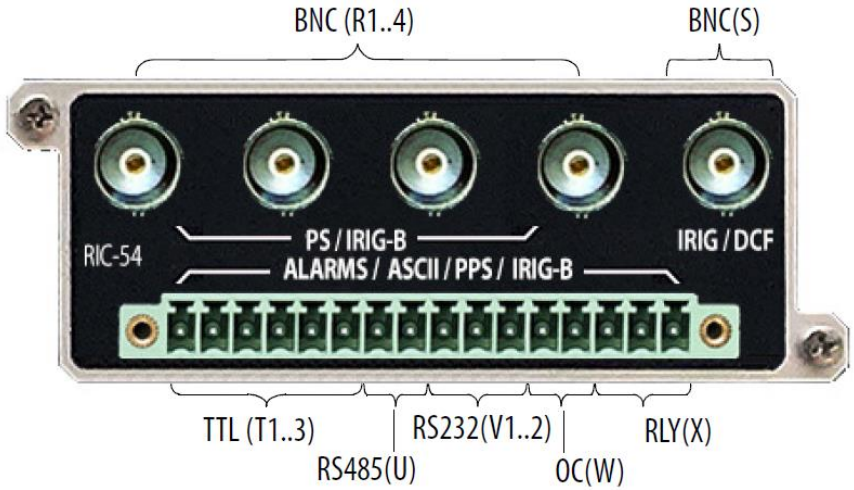
	ToD	IRIGB	PPS	ASCII	DCF77	Alarm	MHz
ST (R1..5)		out	out				out
BNC (R1..5)		out	out				out
BNC (S)		out			out		
BNC (T1..4)		out	out				out

RIC 52



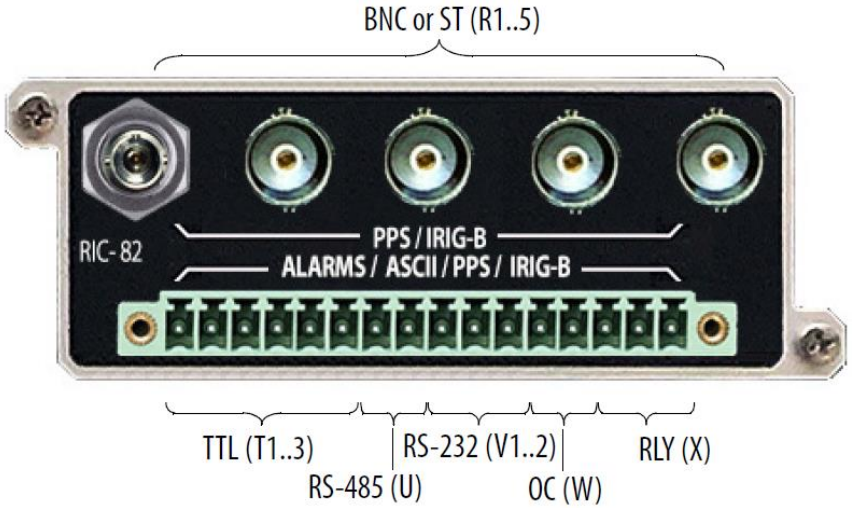
	ToD	IRIGB	PPS	ASCII	DCF77	Alarm	MHz
RJ48 (R1..4)	out	out		out			
BNC (S)		out			out		
BNC (T1..5)		out	out				out

RIC 54



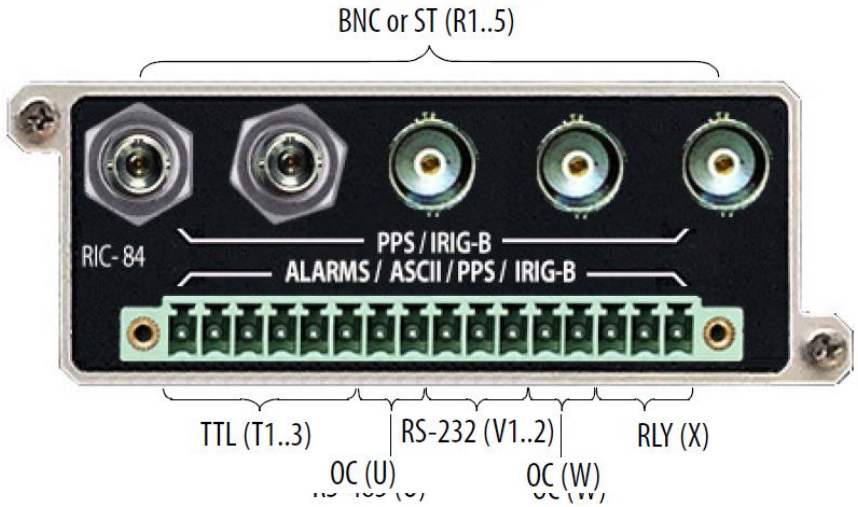
	ToD	IRIGB	PPS	ASCII	DCF77	Alarm	MHz
BNC (R1..4)		out	out				out
BNC (S)		out			out		
TTL (T1..3)		out	out				
RS485 (U)		out	out	out			
RS232 (V1..2)				out			
OC (W)			out			out	
RLY (X)						out	

RIC 82



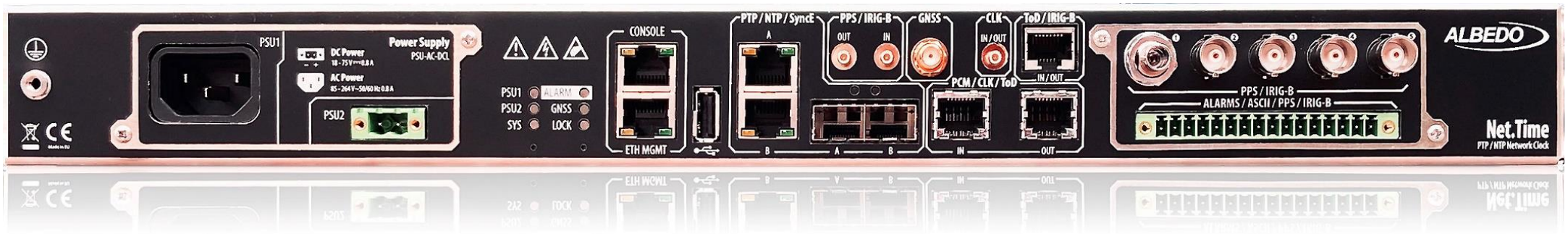
	ToD	IRIGB	PPS	ASCII	DCF77	Alarm	MHz
ST (R1..5)		out	out				
BNC (R1..5)		out	out				
TTL (T1..3)		out	out				
RS485 (U)		out	out	out			
RS232 (V1..2)				out			
OC (W)			out			out	
RLY (X)						out	

RIC 84



	ToD	IRIGB	PPS	ASCII	DCF77	Alarm	MHz
ST (R1..5)		out	out				
BNC (R1..5)		out	out				
TTL (T1..3)		out	out				
OC (U)			out			out	
RS232 (V1..2)				out			
OC (W)			out			out	
RLY (X)						out	

Oustanding **PTP** features

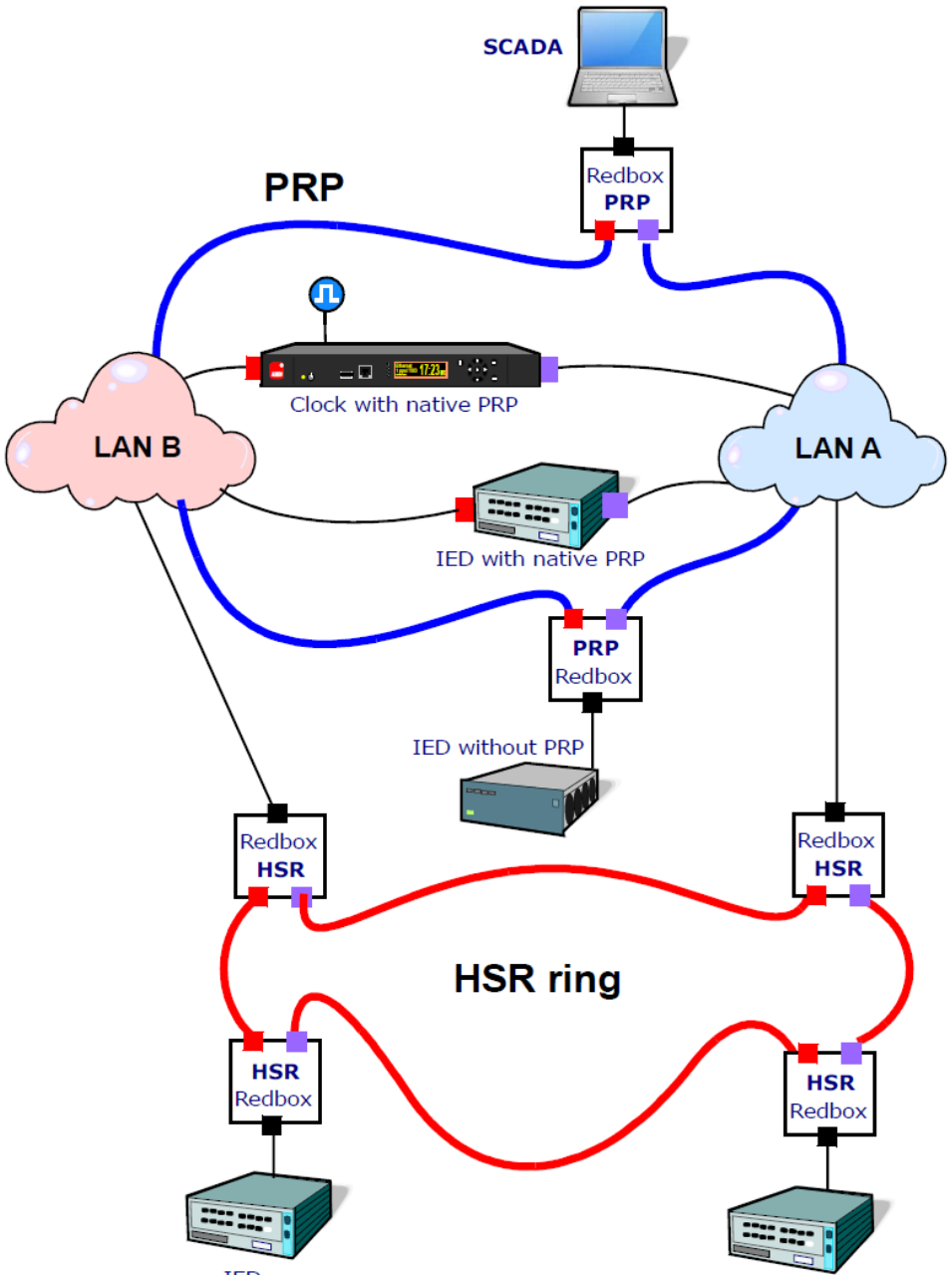


- Optic & electrical interfaces
- 10 / 100 Mb/s
- 512 unicast PTP clients at 128 message/sec
- Profiles: Telecom, Power, Utility profiles
- 2xPorts that may have independent profiles
- PTP Profile translation
- Roles: GrandMaster, Boundary, Slave

NTP server features

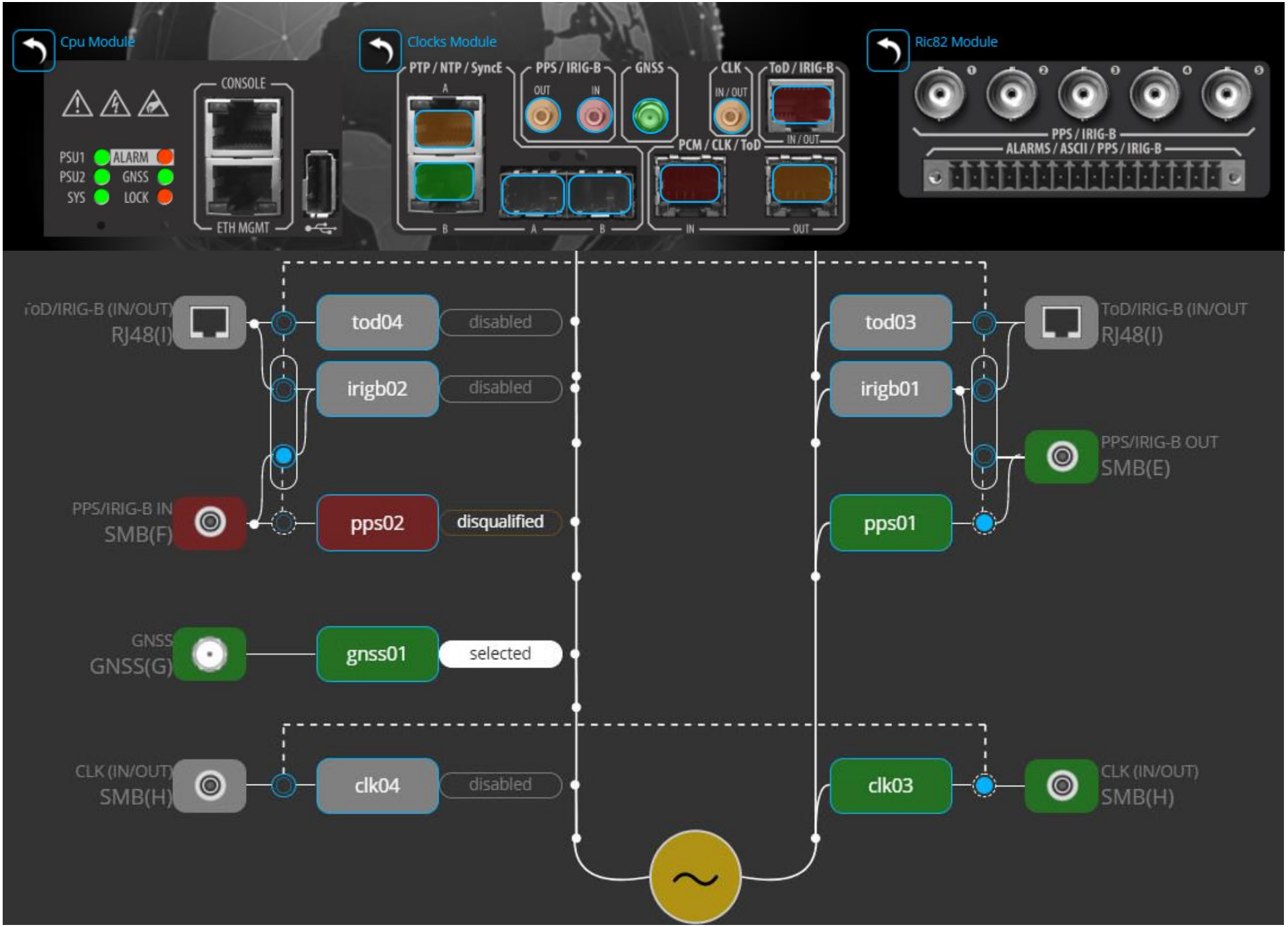
- Server & client modes
- Optical & electrical interfaces
- NTP
  - NTPv3 (RFC 1305) (server and client)
  - NTPv4 (RFC 5905) (server and client)
- SNTP
  - SNTPv3 (RFC 1769) (server)

PRP fault-tolerant to failures



- Net.Time supports PRP (Parallel Redundancy Protocol)
  - PTP for PRP (IEC 62439-3 Annex A)
  - Native interfaces
  - Tolerant to one network failure
  - Mission critical applications

Web Server Interface



Net.Time φ Top **Benefits**

- Integration Clock
  - Universal Protocol translator
  - Universal Profile translator
  - Network fault tolerant
  - Time assurance: n x refs.
  - Flexibility: multiple outputs
- Native PRP support
  - No RedBox required
- Power fault tolerant
- Flexibility: multiple i/o

The Net.Time **family**

		Net.Time φ (Phi)	Net.Time Ω (Omega)	Net.Time T (Tau)
DIFFERENCES	Default rate	100 Mb/s	1 Gb/s	1 Gb/s
	Alarm relay contacts	Optional	Optional	-
	Display	Yes	Optional	-
	Modules	Optional	Optional	-
	IRIG-B	Yes (i/o)	Optional	-
	NTP	Yes (i/o)	Yes (i/o)	-
	PRP	Optional	Optional	-
	PTP Power profile	Yes (i/o)	Optional	-
	PTP Telecom profile	-	Optional	Yes (i/o)
	SyncE	-	Optional	Yes (i/o)
COMMON FEATURES	Platform	19", 1 RU, Aluminum case		
	Temperature	-40 ~ +70°C (Passive cooling)		
	Power Supply	Redundant (2 x Sockets): • AC: 100 ~ 240 VAC, 50- 60 Hz (IEC 60320 C13/C14) • DC: 18 ~ 75 VDC or 43 ~160 VDC (2-pin 5.1 mm) • AC/DC: 85 - 264 VAC and 100 - 370 VDC (2-pin 5.1 mm)		
	Display	Graphical Display (virtual web server interface)		
	GNSS	72 channels (GPS, GLONASS, BeiDou, Galileo)		
	Oscillators	OCXO, Rubidium		
	Accuracy	GNSS <40 ns, ToD <10 ns		
	Holdover	• Rubidium: 100 ns @ 2h; 1µs @ 24 hours; 10 µs @ 120 hours • OCXO: 1µs @ 1 hour; 10µs @ 12 hours		
	PTP Default profile	All models		
	Time signals (in/out)	PTP, NTP, ToD, n x PPS, IRIG-B, DCF77, SyncE, MHz, T1, E1		
	Protocol Translator	Any input signal or protocol to any output signal or protocol		
	Configuration	Slave / Master / Boundary (up to 512 unicast clients)		
	Management	Web Server, CLI, Syslog, SNMP v2, v3		

That' all

www.albedotelecom.com

ALBEDO

in Test we Trust