IVR-Sync
Synchronisation Analysis Tester

IVR-Sync Synchronisation Analyser is specially designed for conducting clock synchronisation of PTN or Packet Ethernet. It is developed in accordance with IEEE1588v2, SyncE, 1PPS+ToD, Ethernet, and E1 such standards, provides a complete clock, frequency, and time synchronisation test solution for operators.

Product images are for illustrative purposes only and may differ from the actual product.

- **Compact and lightweight design**
- **Easy to operate graphical user interface with 6.5 inches outdoor-enhanced LCD colour touch screen**
- **Dial, number keys and function keys for flexible scrolling and selecting**
- **Ultra-high capacity field-exchangeable Li-ion battery pack extends testing time**
- **Support 1588v2 testing, 1PPS+ToD testing, SyncE testing, 1PPS/PP2S testing up to 1000M**
- **Adapted to lab and field environments with optional internal measurement references — GPS and internal rubidium**
- **Support 10M to1000M rate packet Ethernet test functions, such as OAM, MPLS-TP, RFC2544, Y.1564 and so on (Not support now, coming soon)**
- **Support E1/T1 testing (Not support now, coming soon)**
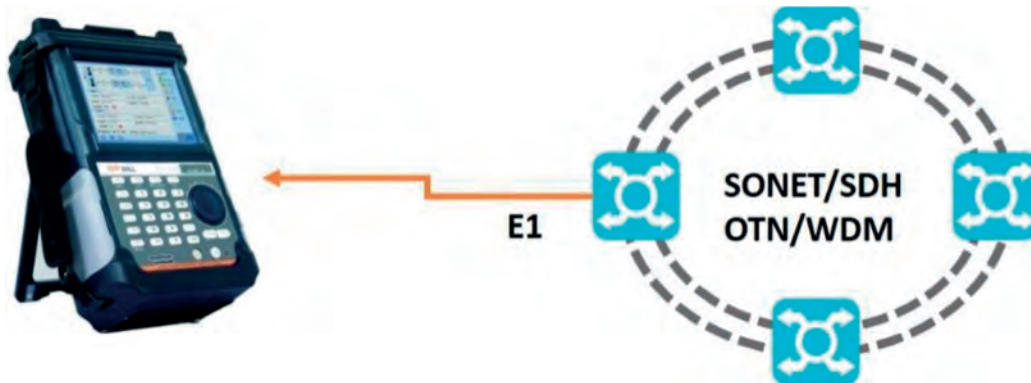- **Remote control by PC using 10/100M Base-T port**

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IVR-Sync Platform Brief

Colour touchscreen
Advanced TFT transflective 6.5" display provides perfect visibility in any sunlight conditions. Graphical menu makes your operation easier and faster

LEDs
LEDs offer crucial test information

Dial
Rugged and durable

Interfaces
USB A/B and RJ45

Number keys
Conveniently input number and IP address

Function keys
Quickly achive various configurations

- Compact and lightweight designed
- Graphical user interface, easy to operate
- 6.5inches outdoor-enhanced LCD colour touch screen
- Ultra-high capacity field-exchangeable Li-ion battery pack extends testing time
- Powerful modular intelligent network test platform
- Dial, number keys and function keys for flexible scrolling and selecting
- Remote control by PC using 10/100M Base-T port

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Main Features

- Support 1588v2, SYNC-E, 1PPS+ToD, and TDM
- Integrated a rubidium or atomic GPS clock, which can keep GPS time signal for 4 hours, beneficial for some situation where is inconvenient for setting GPS antenna
- Support to reproduce UTC time and clock with high precision
- Support to test IEEE1588v2 time server, IP RAN/PTN/OTN/xPON infrastructures, and BS time synchronization precision and performance
- Support 1PPS+ToD, IEEE1588v2 PTP and SYNC-E mask and slave emulation testing
- Support ESMC simulation and analysis, which is in accordance with ITU-T G.8264 standard
- Support to calculate MTIE, TDEV
- Support to conduct 7X24 continuous test to analyse drift performance in a long term situation for time and clock synchronisation
- Support E1 BERT test
- Support 1 Gbit/s data stream in maximum
- Support RFC2544, includes Throughput, Frame Loss, Latency, and Back-to-Back
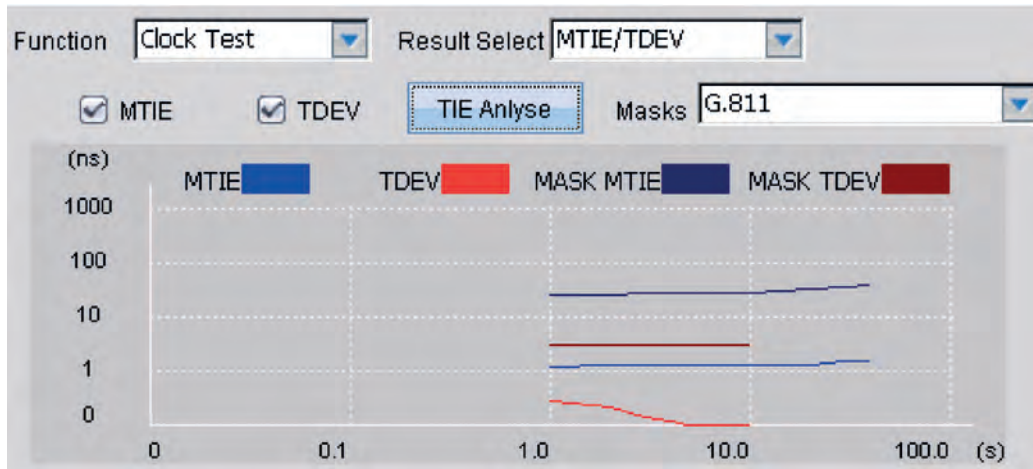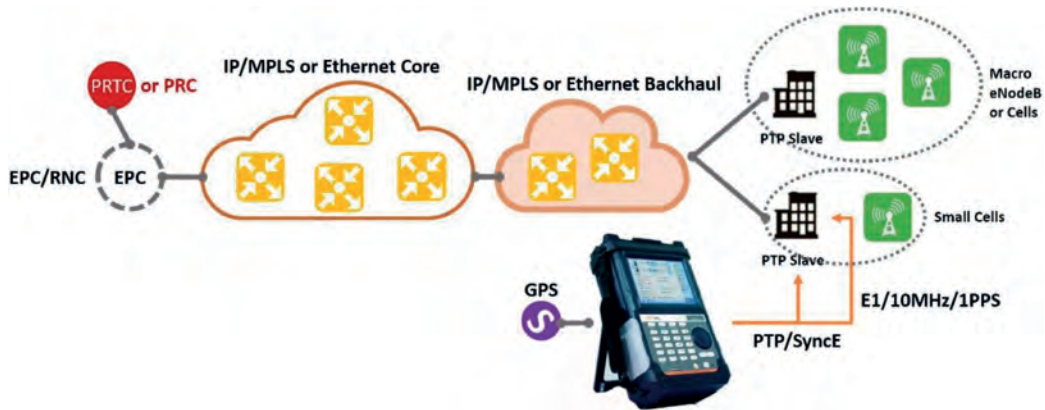- Support Y.1564 test

Applications

TDM Application:

SUPPORT MARKS:

- G.811
- G.812 Type I
- G.812 Type II
- G.812 Type IV
- G.813 Gen SEC Option 1
- G.813 Gen SEC Option 2
- G.813 T-fer SEC Option 2

- G.813 T-sient SEC Option 2
- G.813 Holdover SEC Option 2
- G.823 PDH Sync
- G.823 G.523 PRC
- G.823 G.523 SSU
- G.823 G.523 SEC
- G.8261 EEC Option 1

- G.8261 EEC Option 2
- G.8261.1 Case 3
- G.8262 Gen EEC Option 1
- G.8262 Gen EEC Option 2
- G.8262 T-fer EEC Option 2
- G.8262 T-sient EEC Option 2

IVR-Sync

LTE-A / TDD LTE or FDD LTE / 3G Application:

General Specifications

User Interface	
Screen	6.5 Inch TFT Touch Screen (640 x 480);
Other Interface	
USB	▪ USB 2.0 A type: 2 ▪ USB 2.0 Mini B type: 1
Ethernet	Ethernet 10/100, RJ45
Audio	3.5mm Audio Interface
Storage	8G
Physical Specifications	
Temperature	▪ Operating: -10°C to 50°C ▪ Storage: -40°C to 70°C
Relative Humidity	0% to 95% (non-condensing);
Size(H×W×D)	▪ IVR-Sync-10G platform: 319mm x 202mm x 105mm ▪ IVR-Sync-10G module: 25mm x 97mm x 259mm
Weight	▪ IVR-Sync-10G platform: 2.8kg ▪ IVR-Sync-10G module: 0.8kg
Vibrancy	10Hz to 500Hz < 1.5g (on 3 main axes);
Mechanical Shock	6 sides, 8 edges < 760cm, according to GR-196-CORE;
EMC	▪ EN55022/CIPSR22 ▪ EN61000-3-2 ▪ EN55024
Battery	
Battery	▪ Rechargeable Li-Ion batteries ▪ Working time: 9 hours (typical for Atomic Clock) ▪ Working time: 4 hours (typical for Rubidium Clock) ▪ Charging time: 6 hours (typical: 25°C)
Power Source	▪ Input: 100-240VAC, 50-60Hz, 2A ▪ Output: 19VDC, 4A

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Technical Specifications

Clock

Internal Time Base		
	Rubidium Clock	Atomic Clock
Stability	$5x10^{-11}$ (Typical 25°C)	
Warm up Stability	100s to $< 3x10^{-12}$	100s to $< 2x10^{-11}$
Ageing Rate	24h: $< 5x10^{-11}$ per month	24h: $< 3x10^{-10}$ per month
GPS Disciplining		
Internal GPS	12 channels, high sensitivity, 15ns	
Time Accuracy to UTC	±25ns	
Interfaces		
Time Input	▪ 1PPS+ToD　　　　▪ 1PPS/PP2S　　　　▪ IEEE 1588v2 PTP (Slave)	
Clock Input	▪ SyncE　　　　▪ E1/2MHz　　　　▪ 10MHz	
Output	▪ 1PPS+ToD　▪ 1PPS/PP2S　▪ E1/2MHz　▪ 10MHz　▪ IEEE 1588v2 PTP (Master)	
Reference Clock		
Standard	GPS	
Optional	▪ 1PPS+ToD　▪ BNC 1PPS　▪ E1/2MHz　▪ 10MHz　▪ SyncE	
Synchronous Ethernet Test		
SyncE	▪ Specify quality level of transmitted Ethernet signal ▪ Analysis of QL indicated in received Ethernet signal with alarm at missing QL indications ▪ Result: SSM RX count and rate, SSM TX count, indicated QL statistics, SSF seconds ▪ ESMC message captured and exported in Wireshark format	
IEEE1588v2 PTP	▪ Port of Ethernet interface can be acted as master or slave independently ▪ Supports profiles: G.8265.1, G.8275.1, User defined **Parameter configuration:** ▪ Domain: 0 to 255　　▪ Clock Identify　　▪ Priory #1 or #2, class, time source ▪ Step mode: one-step, two-step　　▪ Accuracy Index: 0 to 255 ▪ Delay mechanism: Delay request/response, Peer delay　　▪ Announce interval: 1/2 to 64 ▪ Delay request interval: 1/16 to 64 ▪ Clock source: internal or UTC locked with GPS　　▪ Sync interval: 1/2 to 256 **Protocol stack:** ▪ Layer2: Ethernet, Ethernet/VLAN ▪ Layer3: none, IPv4 **PTP protocol analysis:** ▪ Statistics of IEEE1588 message and message rate ▪ Logged IEEE1588 events: clock state transitions, state transition events, faults, changes in grand-master clock ▪ IEEE1588 message captured and exported in Wireshark format	

1G Ethernet (Coming Soon)

Ethernet	
Port	• Electrical interface: 1 port, 10/100/1000M Base-T • Optical interface: 1 port, 100/1000M Base-X *User selectable optical module: 850nm, 1310nm, 1550nm*
Ethernet Feature	Auto negotiation, full and half duplex, flow control
Configuration	Monitor/generate, pass-through
Encapsulation	Ethernet type II, IEEE802.3 with 802.2, IEEE802.3 with SNAP
Configuration, Monitoring, and Generation	
Traffic Generation	• Variable line rate traffic generation, up to full line rate • Traffic generation: continuous, burst, ramp, n-frame, n-burst, n-ramp • Adjustable frame size: 64 bytes to 16000 bytes • Frame size: constant, iMAX, random • User-defined traffic mix of unicast and broadcast frames • Fixed or increment MAC/IP identifier • User programmable DSCP/TOS byte • Configurable IP and Ethernet source and destination addresses (support IPv4 and IPv6 addressing) • User programmable TCP/UDP address • Generate pause frames, respond to pause frames • Answer incoming ARP, ping requests

Stacked VLAN	• Up to 3 user-settable VLAN tags
	• Parameters per VLAN tag
	  ▪ Ethernet type II 0x8100 (802.1Q), 0x88a8 (802.1ad), 0x9100, 0x9200, 0x9300
	  ▪ User-defined VLAN ID, CFI, VLAN priority

Multi stream	Number of streams: up to 8 streams per port can be activated
Error Injection	FCS, IP check sum error, UDP/TCP check sum error, bit error
Alarm generation	No link
Result, Monitoring and Generation	
Status	• Link status, interface type, jabber detected, frames present, MPLS/VLAN, speed, full or half duplex, signal present, bit rate of incoming Ethernet signal, auto negotiation complete • Link partner abilities: speed/duplex • Indicators of utilisation, throughput and errored frames • Signal level indication for optical Ethernet interfaces
Performance Statistics	Utilisation, throughput, frame rate

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Frame Statistics	▪ Total frames, total testing frames, total not testing frames, unicast/multicast/broadcast frames, number of pause frames ▪ Total VLAN frames ▪ Total MPLS frames ▪ Total errored framed, number of oversized, normal, and runt frame, number of FCS errored
Frame Distribution Statistics	▪ Total valid/frames, <64, 64-127, 128-511, 512-1023, 1024-1518, >1518
Multi stream	Display information per steam: ▪ Frame loss count/rate, throughput, latency, packet fitter, frames and bytes received and transmitted
Transmit Statistics	Total frames, unicast/multicast/broadcast
Result, Monitoring and Generation	
Filter	Filter condition support: ▪ Source and destination MAC/IP, IPv6, VLAN ID and VLAN priority, MPLS, IP TOS, TCP/UDP source and destination port, Ethernet type and IP protocol
BER Test and Service Disruption Test	
BER Test	▪ Generation and detection of test pattern, count of errors in received test pattern; ▪ Pattern generation: layer 1 to layer4; ▪ Frame loss count and frame loss seconds; ▪ BER measurement results; ▪ Test pattern: PRBS9, PRBS11, PRBS15, PRBS20, PRBS23, PRBS31, CRPRJ, JTPAT, SPAT, 32bits user defined
Error Injection	FCS, IP check sum error, UDP/TCP check sum error, bit error
Service Disruption Test	Service disruption test activated as part of BER test: ▪ Max/avg service disruption test, resolution: 0.1us ▪ Number of service disruption
Loopback	

Loopback Test	▪ Layer 1 to layer 4 loopback test
	▪ Advanced loopback test:
	  ▪ Packet loss setting: percentage, packet count, time
	  ▪ Loopback drop enable: protocol loss, protocol pass, control, CRC error, IP/TCP/UDP error

RFC3393	
Jitter Test	▪ G.711, G.723.1, G.729 and so on VoIP packet jitter test ▪ Jitter result: hits, min, max, current, average

RFC2544	
RFC2544 Test	Switch/router test and single ended network test mode: 　▪ Throughput, frame loss, latency, back-to-back End-to-end network test mode (2 units in local-remote setup): 　▪ Throughput, frame loss, back-to-back

Service Activation Test (Y.1564)	
Service Activation Test	ITU-T Y.1564 Service Activation Test: ▪ Up to 8 services per port ▪ Colour-aware and non-colour-aware in combinations ▪ Test modes: one-way (uni-or bi-directional), round-trip ▪ Verification against service acceptance criteria: information rate, frame transfer delay, frame delay variation, frame loss rate, availability
Service Configuration Test	▪ Subtest for: CIR, EIR, traffic policing ▪ Step duration: 1-60s (user define) ▪ Number of steps: 1 to 4 ▪ Result: pass/Fail indication, IR (min/avg/max), FL (count/FLR), FTD, FDV (min/ avg/ max (during measurement))
Service Performance Test	▪ All services tested simultaneously at CIR ▪ Duration: 15min, 2hours, 24 hours, or user defined ▪ Result: pass/fail indication, IR (min/avg/max), FL (count/FLR), FTD, FDV (min/avg/ max (during measurement))
Remote Smart Loopback	▪ Use as local unit control another remote unit for RFC2544 and Y.1564 bi-directional testing; ▪ Support: layer 1 to layer 4 smart loopback test

Advanced IP Tools	
PING	For connectivity and configuration check: ▪ Round trip time (RTT) ▪ Support IPv4, TTL, URL
Trace Route	Trace IP route over IP network: ▪ Information per hop: PING time, number of ping timeouts

Advanced IP Tools	
VCT Cable Test	Use for CAT5 cable connectivity check: ▪ Status: pass/Fail　▪ Channel ▪ Fault location　▪ Polarity　▪ Pair Skew
Flow Control	Flow control time, us: ▪ Pause time: total, last, max, min　▪ Pause Frame count: TX, RX
FTP Upload/ Download	Use for FTP server and client emulation ▪ Support IPv4 and URL　▪ File upload/download ▪ Username/password　▪ Result: pass/fail indication, upload/download time display

HTTP	WEB access:	
	▪ Support IPv4 and URL	▪ HTTP access pass/fail
Advanced PING *(Topology)*	Advance/Fast PING, PING segments of the IP one by one in one time:	
	▪ IP address range: start, end ▪ Send count	▪ Timeout (ms) ▪ Status: pass/fail indication

MPLS	
Number of MPLS Header	Up to 3 MPLS header set by user
Parameter per MPLS Header	User defined label, EXP and TLL fields in each MPLS header
Statistics	MPLS frame count

OAM *(MPLS-TP)*	▪ Complies ITU-T G.8113.1;
	▪ Support OAM messages:
	  ▪ ITU-T Y.1731: CCM, LBM, LBR, LTM, LTR, AIS, LCK, LMM, LMR, 1DM, DMM, DMR
	  ▪ IEEE802.1ag: CCM, LBM, LBR, LTM, LTR

Ethernet OAM	
OAM Standards	▪ ITU-T Y.1731 service layer OAM ▪ IEEE802.1ag connectivity layer OAM ▪ IEEE802.3 (formerly IEEE802.3ah) access link OAM
Messages	Generate and receive following OAM messages: ▪ ITU-T Y.1731: CCM, LBM, LBR, LTM, LTR, AIS, LCK, LMM, LMR, 1DM, DMM, DMR ▪ IEEE802.1ag: CCM, LBM, LBR, LTM, LTR ▪ IEEE802.3ah: information, variable request, variable response, loopback control
IEEE802.3ah	▪ Discovery ▪ Loopback activate
Statistics	Number of each message generated/received

Ethernet Frame Capture	
Buffer Size	▪ 32Kbytes ▪ When capture buffer full: stop
Capture Data	CAP format for display in Wireshark

PDH (Coming Soon)

Test Patterns				
PBBS	▪ 2E23	▪ 2E20	▪ 2E15	▪ 2E11
User	Allowing user define 8-byte test patterns			

PDH/T-Carrier Bit Error Insertion
▪ 1.5M: Code, Fas, CRC, Bit ▪ 2M: Code, Fas, CRC, Bit ▪ Insertion method: continuous, alternative, burst, single, N-Frame, Rate ▪ Ratio: 1×10-9 to 2×10-3(depending on setting)

Alarm Generation
▪ 1.5M: LOS, LOF, AIS, RAI, PATTERN LOS ▪ 2M: LOS, LOF, LOFM, AIS, RAI, MFRAI, CRCLOFM, PATTERN LOS ▪ Insertion method: continuous, alternative, burst

Measurement				
1.5M	▪ LOS ▪ LOF ▪ AIS	▪ RAI ▪ PATTERN LOS ▪ Code	▪ Fas ▪ CRC ▪ Bit Error	
2M	▪ LOS ▪ LOF ▪ LOFM ▪ AIS	▪ RAI ▪ MFRAI ▪ CRCLOFM ▪ PATTERN LOS	▪ Code ▪ Fas ▪ CRC ▪ Bit Error	
Error and Alarm	▪ Total bit error count or alarm seconds ▪ Total bit error rate ▪ Current bit error rate (advanced 1 second)			
ITU-T G.821 Analysis	▪ Current bit error ▪ Current BER ▪ Total byte bit error ▪ Total BER	▪ ES ▪ %ES ▪ SES ▪ %SES	▪ EFS ▪ %EFS ▪ AS	▪ %AS ▪ UAS ▪ %UAS
ITU-T G.826 Analysis	RAI-based, remote end and near end analysis:			
	▪ BE ▪ BBE ▪ BBE rate ▪ ES	▪ %ES ▪ SES ▪ %SES ▪ AS	▪ %AS ▪ UAS ▪ %UAS	

Ordering Information

Standard Configuration	
Module	**Description**
IVR-Sync	Test Platform, support SDH, OTN, Ethernet, Packet Ethernet, OTDR test modules
	Synchronisation test module
	Adapted to lab and field environments with optional internal measurement references—GPS and internal rubidium
	Prove 1588v2 (PTP), Sync-E etc. implementations. To ITU-T G.8261, etc.
	Prove 1588v2 (PTP) to the ITU-T Telecom Profile G.8265.1
	Test 1588v2 Ordinary Clock
	Support IEEE1588v2 PTP Master Clock and Slave Clock, also support one-step and two-step clock modes
	Support PTP message over Ethernet
	Support setup Sync Announce and Delay_Req PTP message frequency, support PTP header setup, include clock class domain number and so on parameters setup
	Support PTP message statistics
	Measure time and frequency (MTIE/TDEV) to specified limits (G.823, G.824, and G.8261.1.)
	Support IEEE1588v2(PTP),1PPS+ToD,1PPS/PP2S and Sync-E up to 1000M
	Measure2.048MHz/2.048bit/s and 10MHz recovered clock compliance to ITU-T G.823/G.824/G.8261.1 (MITE/TDEV)
Quantity	**Accessories Description**
1	GPS receiving antenna
1	GPS receiving feeder
2	SMA test cables
2	75ohm BNC cables, 2m
2	CAT5 cables, 3m
1	LC/PC to LC/PC full-duplex single-mode fibre, 3m
1	1.25G 1310nm 15Km LC SFP optical module
1	SFP optical port dust proof cap - black - rubber
3	RJ45 electrical port dust proof cap - black - rubber
1	3 pins adapter cable
1	100-240V input and 19V output AC/DC power adapter

1	Disc include user manual and InterVRE remote control software
1	IVR-Sync_EPS
1	Factory test report
1	Calibration certificate
1	One year warranty service

Optional Configuration	
Synchronisation Optional Software	
OIVR-TimeReferASync	Use 1PPS+ToD and IEEE1588v2 PTP as reference time
OIVR-ClockReferASync	Use SyncE, 1PPS, 2.048MHz, 2.048Mbps, 10MHz as reference clock
OIVR-PTP3MSASync	IEEE1588v2 PTP support Unicast and Multicast transmit method with IP Layer
OIVR-SyncEwanderASync	SyncE wander test
OIVR-FrequencyASync	Frequency test feature for SyncE, 2.048MHz, 2.048Mbps, 10MHz
OIVR-EFrequencyASync	Advanced frequency sampling test
OIVR-100FXASync	IEEE1588v2 PTP and SyncE test feature for 100M Base-X port
OIVR-CaptureASync	IEEE1588v2 PTP message capture and decode
OIVR-ESMCASync	SyncE ESMC test
Optional Hardware	
43160031	Lithium polymer rechargeable battery
Twowarranty	Two years extended warranty service
14020160	1.25G-850nm-550m-MM-LC-SFP-DDM
14020090	1.25G-1310nm-15km-SM-LC-SFP-DDM
14020340	1.25G-1550nm-40km-SM-LC-SFP-DDM

● *InterVRE reserves the right to alter and amend the design, characteristics and specifications without notice or obligation.*