

DOBLE PROTECTION TESTING

F6880

Digital Network Analyzer

DETECT AND ADDRESS ISSUES IN IEC 61850 NETWORK TRAFFIC



FEATURES AND BENEFITS

- Lightweight and compact for easy portability
- Multiple field and laboratory applications, in-person and remote use cases
- Software for detailed analysis of captured events and evaluation of network performance
- System event packet capture (PCAP) for analysis in a wide range of network analysis tools
- Numerous user-configurable views available for observing system status in real-time
- Fast setup and intuitive user experience

The Doble F6880 Digital Network Analyzer (DNA) reveals details that are essential to helping protection engineers and relay test technicians quickly resolve issues in IEC 61850 network traffic.

This compact and lightweight instrument is paired with powerful software that analyzes IED communications and provides diagnostic and analytical functionality in real time.

The DNA is a digital substation multimeter, capable of plotting IEC 61850 sampled values (SV) and GOOSE messages via real-time oscillography, phasor, and tabular data views.

It is also a system event recorder, capturing events via customizable triggers and producing analysis reports that allow the user to evaluate network performance and power system anomalies, like voltage sag, harmonic distortion, and underfrequency.

The F6880 compares SV and GOOSE information from SCL files with the present network traffic to identify system misconfiguration issues such as missing, duplicated, or unknown messages.

The DNA can even be left connected in the substation for extended periods, offering remote access and control.

CONNECT

Assign ports to process bus, station bus and control networks and save along with other setup configurations for sharing and future plug-and-play efficiency.



Display
Firmware Version
IP Address

2 x SFP Ports
Copper/Fiber
1 Gbps each

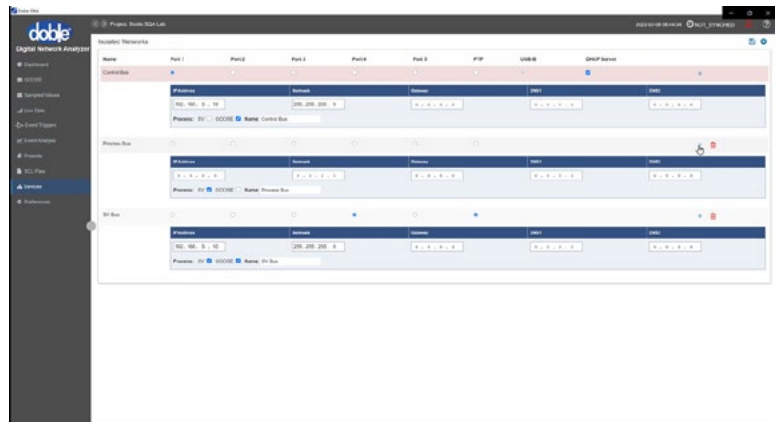
3 x RJ-45 Ports
10/100/1000 Mbps each

USB 3.0 Type B
Control

USB 3.0 Type A
Future Use

SUBSCRIBE

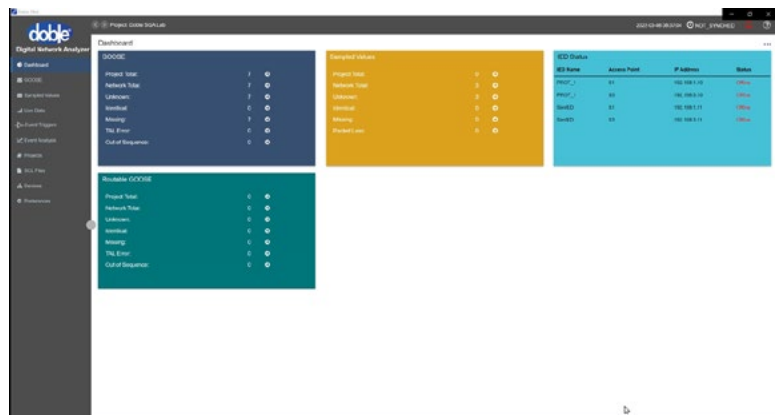
Import SCL files to find baseline IED parameters. Create up to 3 networks to filter SV and GOOSE from Process/Station buses. Synchronize with PTP grandmaster clocks to achieve sub-microsecond network time synchronization.



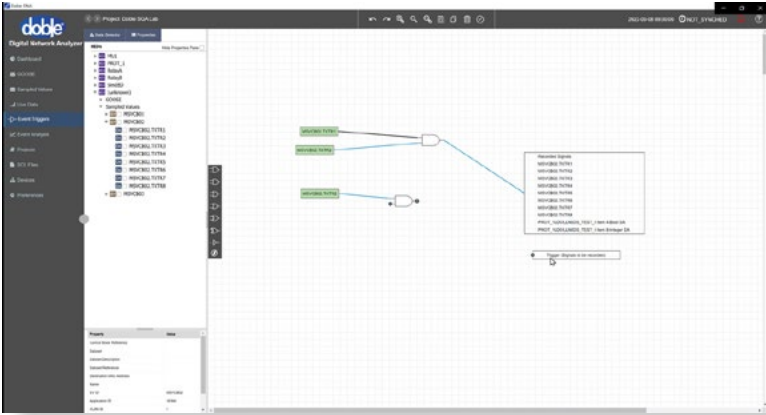
Assign ports to isolated networks to monitor multiple subnetworks simultaneously.

MONITOR

Select individual GOOSE and SV control blocks to analyze. The DNA can sample and display 16 sampled values streams simultaneously.



The Dashboard combines a high-level aggregate view with quick navigation to present key information about the networks being monitored.



Set DNA triggers to record data prior to and following events. The captured data is scanned to produce an Event Analysis Report.

CAPTURE

Create custom event trigger configurations that combine any number of Boolean logic gates with comparators that measure SV quantities and data attribute values in GOOSE packets. Capture all network information for a set duration.



Configure the Live Data screen with oscillography, metering, and/or tabular UI elements to display live GOOSE and SV being polled from the network.

ANALYZE

Observe network traffic and apply deep mathematical analysis of analog quantities and network performance. Quickly navigate to lists that isolate the information. See instances of corrupted GOOSE and SV streams.

Time	User	Description	Priority
2022-01-08 14:05:06	Network	Network message changed: NetPhasConfiguration: NetPhasControl Bus: 102.108.1.10, 102.200.200.1, NetPhas Pair 1: 102.108.1.10, 102.200.200.1, NetPhas Pair 2: 102.200.200.1, NetPhas Pair 3: 102.200.200.1, NetPhas Pair 4: 102.200.200.1, NetPhas Pair 5: 102.200.200.1, NetPhas Pair 6: 102.200.200.1, NetPhas Pair 7: 102.200.200.1, NetPhas Pair 8: 102.200.200.1, NetPhas Pair 9: 102.200.200.1, NetPhas Pair 10: 102.200.200.1	High
2022-01-08 14:05:06	System	DNF application disabled auto connect device: 102.108.1.10	Medium
2022-01-08 14:05:06	User	DNF application disabled auto connect device: 102.108.1.10	Low
2022-01-08 14:05:06	PTP	PTP status changed to PTP_31014805	High
2022-01-08 14:05:06	User	DNF application disabled auto connect device: 102.108.1.10	Low
2022-01-08 14:05:06	PTP	PTP status changed to PTP_31014805	High
2022-01-08 14:05:06	User	DNF application disabled auto connect device: 102.108.1.10	Medium
2022-01-08 14:05:06	User	DNF application disabled auto connect device: 102.108.1.10	Medium

DNA system logs provide timestamped evidence of configuration changes, system events, and general information such as PTP synchronization times.

MANAGE

Save work in sharable .dna project files. Export events in PCAP and/or COMTRADE for sharing with other network/power-analysis tools. DNAs maintain security with encrypted PC communications, deny-by-default on all ports, and checksum validations on updates.

FUNCTIONAL SPECIFICATIONS

IEC 61850	(all editions and amendments, unless otherwise noted) IEC 61850-6 (SCL files) IEC 61850-8-1 (GOOSE over Ethernet) IEC 61850-9-2 (SV over Ethernet) IEC 61869-9 (Digital interface for instrument transformers) IEC 61850-90-5 (Routable GOOSE)
Industry Guidelines	Implementation Guideline for Digital Interface to Instrument Transformers Using IEC 61850-9-2
Time Synchronization	RFCs 5905 and 4330 (Network Time Protocol/ Simple Network Time Protocol) IEEE 1588 (Precision Time Protocol), with support for PTP profiles: IEC/IEEE 61850-9-3:2016 IEEE C37.238-2011 IEEE C37.238-2017
Dashboard	IED Online/Offline status Missing/Identical/Unknown GOOSE/R-GOOSE/SV stream identification SV lost packet(s) indication GOOSE packets Out of Sequence indication GOOSE Time Allowed to Live Exceeded indication
Live Data	16 SV streams 128 GOOSE messages
Event Triggers	Custom, combinatorial logic-based trigger functionality, with the ability to trigger on and record up to — 3 SV streams, triggering on: Symmetrical Components RMS/peak-to-peak Phase Frequency ROCOF 10 GOOSE messages, triggering on: Floating point magnitude Boolean Quality
Event Analysis	Record 1 to 20 seconds of pre-trigger/post-trigger event information 1 PCAP file generated per each SV, GOOSE, and R-GOOSE stream COMTRADE file generated according to IEEE C37.111-2013 Packet Variation Delay (or "Jitter") Analysis of each SV stream System Power Analysis (requires SV streams with at least 3 TCTR and 3 TVTR)
Data Visualization	SV Analog Scope SV Phasor Diagram Symmetrical Components GOOSE Digital Scope GOOSE Tabular Graph

GENERAL SPECIFICATIONS

Memory	240 GB Non-volatile memory (SSD)
Cyber Security	Access supervision and logging TLS Encrypted Control Bus Full Network Isolation
OLED Display	IP Address of Control Bus Firmware Version
Software	Windows PC application
Firmware	Package upgrade via PC application
Dimensions	Length: 8 in (20.32 cm) Width: 5.5 in (13.97 cm) Height: 3 in (7.62 cm) Weight: 3 lb (1.36 kg)
Power	12 V DC (back of device) 2 A
Power Connector	DC Barrel Jack, center pin positive Ø 2.5 × 5.5 × 9 mm Ø 0.098 × 0.217 × 0.35 in
Certifications	ROHS FCC Class A CE IEC 60529 IP2X CFR 47 FCC Part 15 Subpart B Class A (EMI Emissions) EN 61326-1:2013 (EMI Emissions) IEC 61010-1:2010 (EMI Emissions)
Operating Temperature	32° to 131° F (0° to 55° C)
Storage Temperature	-4° to 176° F (-20° to 80° C)
Includes	1 x F6880 Digital Network Analyzer 1 x Power supply 1 x Power cable 1 x Cat6 cable 1 x USB flash drive (2 Gb) 1 x USB-A to USB-B cable 2 x SFP transceivers (1000BASE-T) 1 x Hard shell case with form cut foam interior padding 1 x F6880 User Manual (software based) 10 x Software user seats

The performance of the recording system is largely dependent on the simultaneous use and the combination of: the number and types of monitored signals; the number of signals used for on-line visualizations; the number and types of visualizations; and the number and types of recording triggers used. The numbers stated here are typical and should provide satisfactory performance. If these numbers are exceeded, possible degraded performance can be expected.



Specifications are subject to change without notice.

Doble is an ISO 9001 & ISO/IEC 17025 & 17034 Certified Company.

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