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Simgenet SVP — Validation Platform Datasheet

Simgenet SVP is a network test and validation platform that combines traffic, time synchronization, OAM and IEC 61850 testing in a single instrument, documenting every result with evidence-based, sealed reports against international standards.

Simgenet SVP (Validation Platform) is an **independent network validation and test platform** developed entirely in-house by Simgenet. It is designed for evidence-based verification of routers, switches, time servers (GM/BC) and line quality against **RFC / ITU-T / MEF / IEEE / IEC references** in critical infrastructure, service provider and power utility (IEC 61850) networks. It is vendor-independent: any manufacturer's device is tested with two test ports and standard methodology. Every test is stored in the database with its parameters, raw data and PASS/FAIL verdict, and produces a customer-deliverable, lockable report.

Model: **SVP-100G** · Document version 1.0 (July 2026)

Use Cases

Laboratory validation: router/switch R&D and regression testing — automated test matrix before every release

Field SLA activation: Y.1564 / RFC 2544 acceptance test at turn-up + sealed customer-deliverable report

Power / substation commissioning: IEC 61850 GOOSE/SV, Power-Profile PTP and HSR/PRP verification

Timing infrastructure validation: GM/BC/time-server conformance (G.8273.2/G.8272 masks), holdover and resilience

Continuous monitoring (sentinel mode): permanently attached to the installation; periodic conformance rounds + GM announce-change tracking + SNMP/NMS alarms — faults detected the moment they occur

Interoperability: vendor-independent reference measurement arbiter in multi-vendor environments

Positioning

Single platform: Ethernet traffic testing (1G–100G) + PTP/NTP/gPTP timing analysis + Y.1731 OAM + TWAMP/STAMP + TSN + IEC 61850/HSR-PRP — capabilities that require separate instruments or separate licenses on commercial testers, in one box.

Hardware-timestamped, ns-class measurement: functional validation, conformance testing and SLA activation in the field and in the lab.

Transparent evidence philosophy: the report states not only the result but also **what the test does and does not prove** (duration-validity tiers, raw-data appendix, compliance stamp).

Test Capabilities

Ethernet Performance (RFC 2544 / RFC 9004 / ITU-T Y.1564 / MEF)

RFC 2544: throughput (NDR, binary search + sweep), latency (LIFO/FIFO/LILO — store-forward/cut-through distinction), frame loss, **back-to-back burst (RFC 9004)**; 64…9600B jumbo and IMIX/EMIX frame profiles

Y.1564 Service Activation Test (SAT) — full scope: service configuration test (CIR ramp 25-50-75-100%, EIR, CBS/EBS burst, color-aware PCP/DSCP) + service performance test (multi-service concurrent, 15min/2h/24h)

Policing/overshoot step per the standard formula: test rate CIR+1.25×EIR; SAC band CIR×(1−FLR) ≤ IR ≤ CIR+EIR+M (M parametric)

Y.1563 availability: SES / Unavailable-second state machine, availability KPI

RFC 6349 TCP throughput: BDP/RWND, Transfer-Time-Ratio, Efficiency %, Buffer-Delay %

RFC 2889 L2 switch tests: MFR, HOL/congestion, address learning/caching, broadcast

RFC 3918 multicast: throughput, join/leave latency, group capacity

In-house EMIX L2 traffic engine: own sequence numbering and monotonic timestamping — **FLR / FTD / FDV / dup / reorder** in a single tool; 802.1Q PCP/DEI, L1-calculated pacing

MEF 66 latency histogram (PD bins) · MEF 48.1/35.1 report compliance

Impairment generation: controlled delay/loss/jitter/reorder/dup injection for DUT resilience testing

Micro-burst and latency-under-load analysis: per-flow latency histogram, PDV/IPDV (RFC 5481)

PCAP export: packet-level capture of test traffic, downloadable for analysis

Stress testing: long-duration load with resource monitoring

Protection switching / ring failover measurement: service disruption time (ms) and loss window on link break (SR TI-LFA, ERPS, HSR/PRP scenarios)

Bidirectional FD, single-port reflector (field PoC), software-vs-hardware comparison runs

100G load generation: DPDK/TRex engine

Y.1731 / SOAM Ethernet OAM (ITU-T G.8013)

ETH-CC continuity + LOC detection · **ETH-DM/DMM** delay (FD/FDV) · **ETH-LM/LMM** frame loss · **ETH-SLM/SLR** synthetic loss (MEF 35.1)

Self-test (internal loop) and real-DUT (peer MEP) modes; in-service measurement

TWAMP / OWAMP / STAMP

TWAMP (RFC 5357): always-on reflector + stateful session tracking — forward/reverse loss separation, dup/reorder; TWAMP-Light

STAMP (RFC 8762): sender + reflector; TWAMP↔STAMP reflection auto-detection

OWD — true one-way delay: via PTP synchronization (not a round-trip estimate)

Time Synchronization — PTP (IEEE 1588-2008/2019)

Hardware-timestamped measurement; **cTE / dTE / maxTE**, **MTIE / TDEV**, PDV suite (Sync-PDV, FollowUp-PDV, DelayReq-PDV, FPP/FPC/FPR — G.8261.1)

PASS/FAIL against standard masks: G.8273.2 (A ≤100ns · B ≤70ns · C ≤30ns) · G.8272 PRTC (A ≤100ns · B ≤40ns) · G.8271/G.8271.1 · IEC 61850-9-3 / IEEE C37.238 (≤1µs) · Y.1541 PDV

AUTOMATIC path asymmetry detection — exposes the hidden constant time error

Duration-validity discipline: short test = lock verification; cTE ≥1000s, field conformance ≥10000s, wander 24-72h — the report prints an explicit warning on insufficient duration

GM announce analysis: clockClass, accuracy, priority1/2, timeSource, leap flags, traceability; **change-event stream** (clockClass/UTC-offset/traceability transitions into the event log)

PTP under load (traffic + mask in a single run) · **noise tolerance** (servo behavior under controlled impairment) · delay_req load test · servo state tracking (ACQUIRING→LOCKED→HOLDOVER)

24h+ holdover testing with defined TE limit · PTP v2/v2.1 interoperability check

PTP auto-discovery: "just plug the cable" — automatic domain/profile/GM detection, vendor-independent

Synchronous Ethernet — SyncE (ITU-T G.8262/G.8264)

ESMC/QL message analysis, QL transition tracking, SyncE↔PTP hybrid scenario validation

Time Synchronization — NTP

offset / RTT / stratum / root delay-dispersion / precision / leap; RMS offset, cTE/maxTE (PRTC metrics when hardware-timestamped), frequency drift

NTP under load · NTP server pool management + preflight; client list

TSN (Time-Sensitive Networking)

gPTP (IEEE 802.1AS) profile testing

802.1Qbv (time-aware shaper): gate-latency / bounded-latency / determinism measurement (gPTP-synchronized)

802.1Qbu frame preemption and **802.1CB FRER** validation

IEC 61850 / Power Utility Automation

GOOSE/SV generation + analysis + capture (sniff); **SCL import** for automatic scenarios from the project files

QoS-61850 scenario: GOOSE-class traffic latency/loss criteria under background saturation

Power-Profile PTP masks (IEC 61850-9-3 / IEEE C37.238)

HSR/PRP RedBox seamless failover measurement (IEC 62439-3) — break the ring, prove zero loss

On-Device Correlation (the SVP difference)

On FAIL, the DUT's (GNSS GM/BC) event window is fetched automatically and attached to the report as an **"On-Device Correlation"** block — wire measurement + device internal state in a single report

DUT Management and Automated Testing

Multi-vendor DUT adapters: ready drivers for Cisco, VyOS, SMGOS and generic Linux devices — automatic configuration, verification and factory reset; new vendor adapters plug in modularly

Device inventory: DUT records (SSH/CLI access), port discovery, wiring map, ping/preflight/quick-status

CLI integration: DUT running-config snapshot, suggested test configuration, pre-test automatic configuration + post-test verification/cleanup, device config backup

In-DUT capture and bottleneck analysis: simultaneous counter/resource sampling from the DUT during the test — whether the problem is on the wire or in the device is separated in one report

Glitch classifier + hardware sensor monitoring: anomaly signatures classified automatically; NIC/optics/temperature sensors sampled

Auto-Test sessions: DUT selection → combination preview → unattended multi-test execution; best-config recommendation

Escalation reports + health pattern library: recurring fault signatures classified automatically

Reporting and Record Discipline

Every test is stored in PostgreSQL with **report no (SVP-YYYY-MM-DD-nnn) + test no + customer/project/device + operator**, raw data included (DB-first)

Report outputs: **PDF / CSV / HTML / print**; Appendix-A raw data section (audit/repeatability); live test streaming via SSE

Compliance stamp + report lock: a locked report cannot be modified; engineer notes field; "Lab/quick-scan" ↔ "formal conformance" labeling

Test comparison, archiving, re-run, diagnostic bundle download

Event log (level/code dictionary) + audit trail

Management, Monitoring and Integration

Web interface (HTTPS): test triggering, live run banner, history, device/customer/project management; role-based users (admin/operator/viewer), brute-force lockout, PBKDF2

REST API (OpenAPI): all tests and management via API — automation/CI integration

SNMP: SIMGENET-SVP-MIB with test-FAIL and hardware-signal traps; NMS (Zabbix) integration — verdicts/maxTE flow to central monitoring automatically

Branding: logo + letterhead customizable per customer/integrator

Network management: NIC inventory (DPDK↔kernel port switching from the UI), management interface settings, live link status

Backup (downloadable, with manifest) + **factory reset**; server-clock discipline (UI always shows the SVP server clock; chrony/NTP fallback chain)

Automatic periodic conformance rounds; watchdog; all test services persistent across reboot (hardened systemd)

Hardware Platform (SVP-100G)

Test ports: 1G · 10G · 100G (QSFP28) — modular NIC architecture

Timestamping: NIC hardware timestamp (PHY/PTP)

Traffic engine: DPDK/TRex (100G) + in-house EMIX L2 engine (precision FLR/FTD/FDV)

Database: PostgreSQL (raw data + report archive)

Management: HTTPS web + REST API + SNMP trap

Licensing Model

Capacity and feature packages are license-enabled:

Rate class: 1G / 10G / 100G test capacity

Packages: Ethernet Performance (RFC 2544/9004, Y.1564, RFC 6349/2889/3918) · OAM (Y.1731, TWAMP/STAMP/OWAMP) · Timing (PTP/NTP/gPTP conformance) · TSN (Qbv/Qbu/FRER) · Power (61850 GOOSE/SV, HSR/PRP)

Reference Standards

RFC 2544 · RFC 9004 · RFC 6349 · RFC 2889 · RFC 3918 · RFC 5357 (TWAMP) · RFC 4656 (OWAMP) · RFC 8762 (STAMP) · RFC 5481 (PDV) · ITU-T Y.1564 · Y.1563 · Y.1541 · G.8013/Y.1731 · G.8261.1 · G.8262/G.8264 · G.8271/G.8271.1 · G.8272 · G.8273.2 · MEF 35.1 · MEF 48.1 · MEF 66 · IEEE 1588-2008/2019 · IEEE 802.1AS/Qbv/Qbu/CB · IEC 61850-9-3 · IEEE C37.238 · IEC 62439-3 (HSR/PRP)

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