

# OKTET Labs Test Environment

HG Automatic Testing Training

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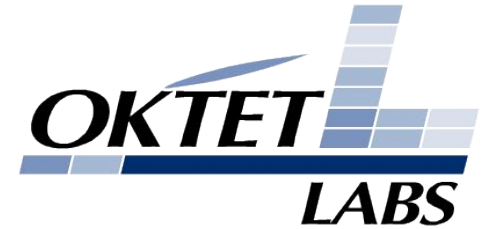
# Plan

- Development Goals
- Architecture
  - Structure
  - Agents
  - Engine
- Gateway testing

# Development Goals

- QA of developed products
- Several pure-testing projects
  - Socket API
  - iSCSI
  - Ethernet NIC firmware and drivers
  - IPv6
  - ...
- Strong regression detection tool

# Key features

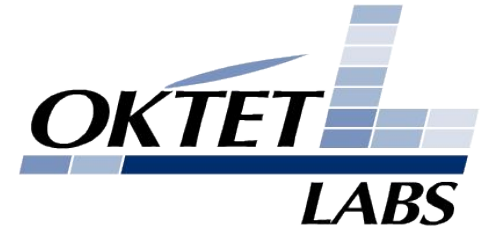


- Black and white box testing
- Distributed testing
- Automatic testing
- Test coverage estimation
- Regression tracking tools
- Cross-platform testing
- Networking protocols support
- Strong scenarios parametrization system

# Used in

- IPv4/IPv6 Socket API (more than 8000 tests);
- Ethernet switch testing;
- IEEE 802.2 (LLC), IEEE 802.1Q (VLAN);
- IEEE 802.1D (STP);
- ATM/AAL5 testing;
- Elements of 802.1X, WPA, WPA2, RADIUS client on Access Point;
- iSCSI testing;
- CLI testing;
- Testing SNMP MIBs;
- DHCP Client testing;
- CableHome1.0 some portal testing;
- Hyperlan2 MAC layer;

# Base components



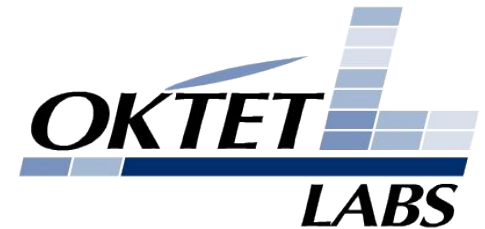
## **Test Engine**

- Run on Linux
- Build all components of TE
- Control of Test Agents
- Keep track of configuration changes
- Run tests
- Centralized log gathering

# Test Agent

- Target-specific application
  - Linux
  - FreeBSD
  - NetBSD
  - Windows
  - OpenSolaris
- Run on an auxiliary station **or** DUT
- Configuring station  
(interfaces, routes, etc.)

# Test Agent



- Generates/Handles network traffic:
  - Packets representation in ASN.1 format
  - Packet iteration, inter packet interval, number of packets
  - Sophisticated incoming traffic matching
- Supported packet formats:
  - IEEE-802.3, IEEE-802.1D, IEEE-802.1Q, IEEE-802.2
  - ATM, AAL5
  - ARP, IPv4, IPv6, PPP, ICMPv4, UDP, TCP, DHCP, SNMP
  - ...



# Test Agent

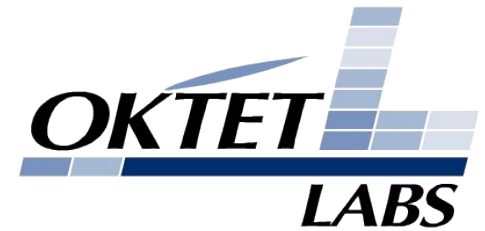
- Sun RPC functionality

- socket API
- remote command line
- Curl
- File operations
- ...

- Daemons configuration:

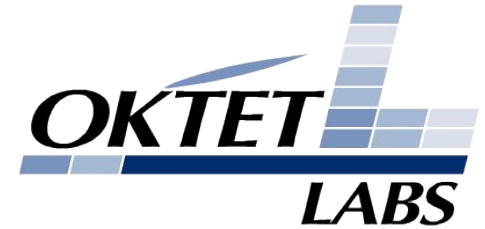
- DHCP, DNS, FTP, TFTP, SNTP, LDAP, Radius, VTUN, 802.1X supplicant

# Auxiliary Agent



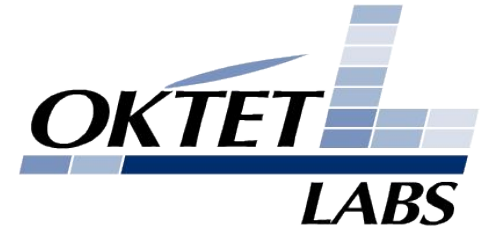
- Black Box testing:
  - Network protocols
  - Interoperability
  - External Interfaces (SNMP, CLI)
- Access to external equipment:
  - Sophisticated traffic generators
  - Media-specific condition emulators

# Embedded Agent



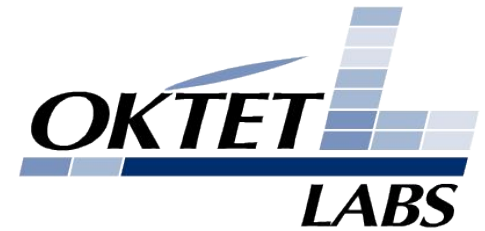
- White Box testing:
  - Module testing
  - API testing
  - DUT-specific management

# Proxy Agent



- Configure DUT
- Access to external equipment

# Test Engine Components

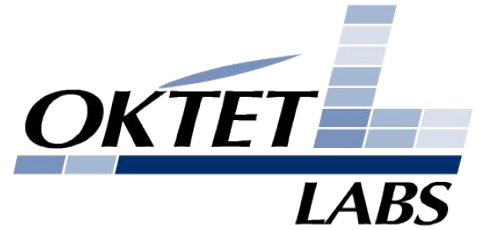


- Dispatcher
  - Runs/terminates all modules
  - Handles user interrupt events
- Builder
  - Based on autoconf/automake/m4
  - Cross compilation of Test Agents
- Logger
- RCF (Remote Control Facility)
- Configurator
- Tester

# Logger

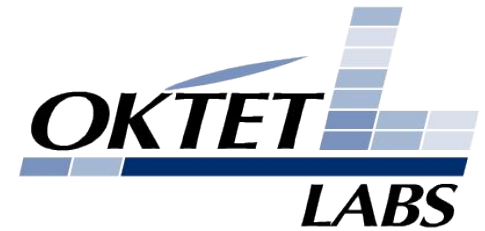
- Provide unified logging interface for all TE components: Test Engine and Test Agents
- Time synchronization between Agents and Engine
- Sort out logs by timestamps
- Define a number of log levels
- Gather log dumps from Test Agents
- Extended format qualifiers (to log files, memory dumps, packets)
- Save log messages into a binary file

# Remote Control Facility



- Starts Test Agents according to configuration file or on-fly requests
- Provides access to services exported by Test Agents
- Controls concurrent access to Test Agents

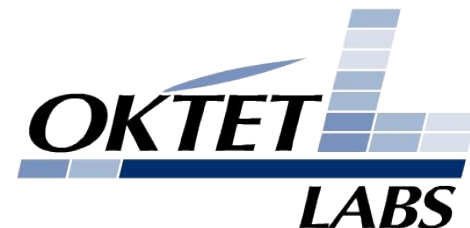
# Configurator



- Loads start-up configuration of Agents
- Keeps track of configuration changes
- Rolls back configuration to a specified point
- Restores configuration after Test Agent crash
- Save configurations in XML format

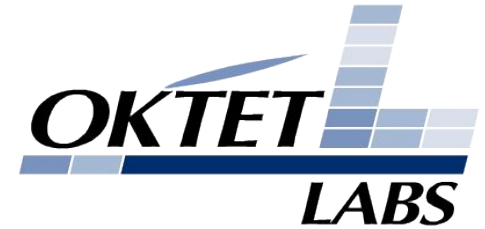


# Configuration Tree



```
/agent:Agt_A/interface:eth0 =  
  /agent:Agt_A/interface:eth0/index: = 2  
  /agent:Agt_A/interface:eth0/link_addr: = 00:16:d3:26:98:91  
  /agent:Agt_A/interface:eth0/mtu: = 1500  
  /agent:Agt_A/interface:eth0/net_addr:192.168.56.1 = 24  
  /agent:Agt_A/interface:eth0/net_addr:192.168.56.1/broadcast: = 192.168.56.255  
  /agent:Agt_A/interface:eth0/net_addr:fe80::216:d3ff:fe26:9891 = 64  
  /agent:Agt_A/interface:eth0/net_addr:fec0::1 = 48  
  /agent:Agt_A/interface:eth0/status: = 1  
...  
/agent:Agt_A/route:192.168.56.0|24 = 0.0.0.0  
  /agent:Agt_A/route:192.168.56.0|24/dev: = eth0  
  /agent:Agt_A/route:192.168.56.0|24/irrt: = 0  
  /agent:Agt_A/route:192.168.56.0|24/mtu: = 0  
  /agent:Agt_A/route:192.168.56.0|24/win: = 0  
...
```

# Tester

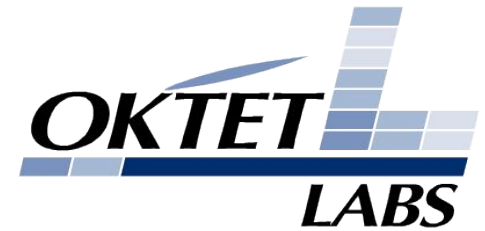


- Structured test suite organization
- Test iteration by parameters
- Test Agents can be automatically preconfigured before test run
- Requirement validation

# TE auxiliary tools

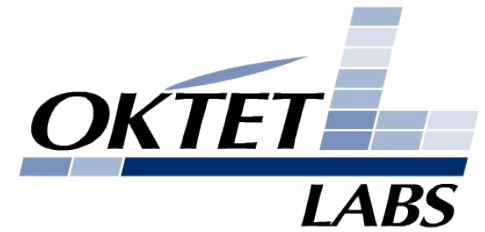
- Test Coverage Estimation
- Report Generator
- Test Result Comparator

# HG Testing

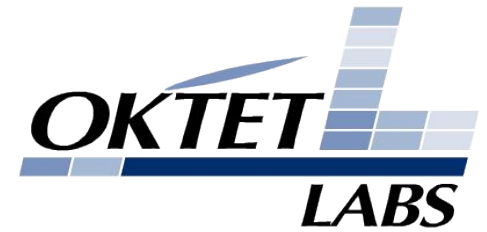


- Proxy agents
- Parametrization
- Networking capabilities
- Serial console logging
- Management interfaces
  - VCM
  - WebUI
  - cutils

# Configuration 1



# Configuration 2



Questions?