



Company & Product Overview

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Company Overview



- ◆ Established in 2000 by Ben Greear, CEO, author of Linux VLAN code.
- ◆ Address a niche of affordable real world network traffic generation equipment – LANforge FIRE.
- ◆ Initially, HW based but moved to COTS HW with advantages of realism.
- ◆ Architecture facilitated development of network emulation equipment – LANforge ICE.
- ◆ Proponents of the Open Source advantage and the value proposition for our customers.

Sales Process

◆ Winning sales:

- LANforge is typically the most affordable option.
- Feature set is near the top of the industry.
- Currently, no other solution supports line-speed GigE and virtual-routing capabilities, in conjunction with integrated LANforge-FIRE traffic generation feature set.
- Small company means excellent tech & pre-sales support. There is only top-tier support, no bottom-tier out-sourced support staff to waste customer's time.
- Flexible licensing that does not restrict deployment topologies, i.e. move LANforge from lab testing to field testing is not restricted.
- Able to add reasonable customer requests in timely manner, independent of road map.



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<http://www.candelatech.com>
sales@candelatech.com
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Network Testing Solutions



LANforge FIRE generates network traffic at various speeds with the ability to monitor packets for throughput and correctness. LANforge FIRE sits on the edge of your network and tests your network core.

[More Info](#)

LANforge ICE



LANforge ICE emulates networks that involve limited bandwidth, latency, packet loss, and corruption. LANforge ICE tests the behaviour of devices that sit on either side of an impaired network. [More Info](#)

All LANforge systems include a platform independent [Graphical client](#) and a [scriptable](#) telnet management interface for automated testing. For examples of how the LANforge system can help with your testing needs, see the [LANforge Overview](#).

NEWS!

[Game Developers Conference 2008](#)

February 18-22 - San Francisco, CA - Moscone Center

[Booth 5546 North Hall](#)
[NH Floor Plan](#)

Be sure to stop by our booth to see our [CT970](#) demonstration, a 24-port WAN Emulator capable of impairing the network connections of 24 individual gaming consoles. Grab a T-shirt and see how good your fragging skills are with 200ms of random jitter! Or try any of the other impairments available with [LANforge ICE](#). Please [contact us](#) for more information on how LANforge can help meet your network game testing needs.

LANforge Links



- ◆ Support Mailing List:

<http://www.candelatech.com/mailman/listinfo/lanforge>

- ◆ Download Presentations and Datasheets:

<http://www.candelatech.com/pdfs>

- ◆ Self Guided Training - Cookbook:

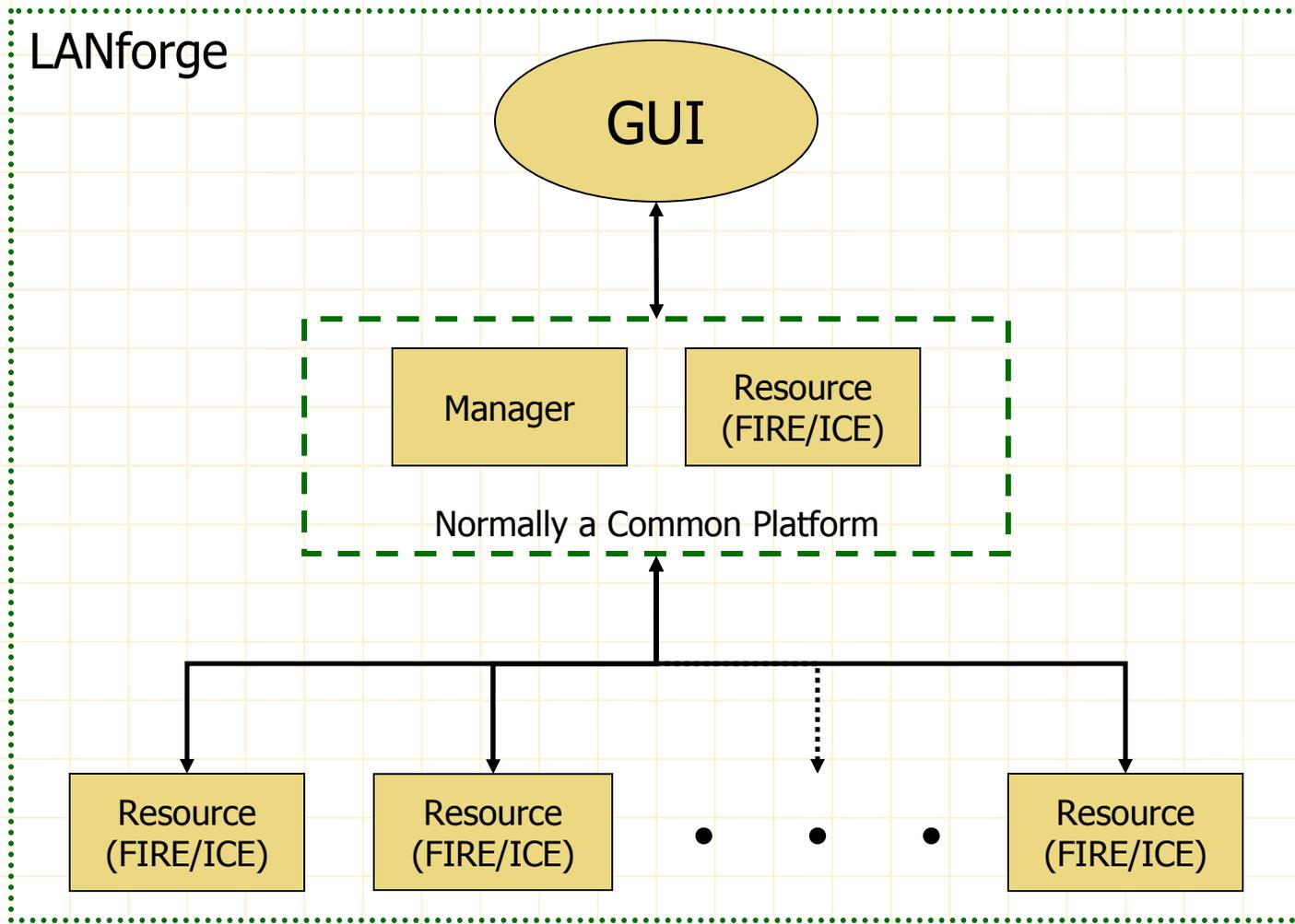
http://www.candelatech.com/lanforge_v3/lfgui_cookbook.html

- ◆ Documentation and FAQ:

<http://www.candelatech.com/doc.html>

<http://www.candelatech.com/wiki/index.php/LANforge-FAQ>

System Architecture



System Elements



- ◆ The **System**: GUI, Manager and Resources
- ◆ The **GUI**: Displays and records data reported by the Resource Manager. Generates control and configuration requests to the Resource Manager.
- ◆ A **Manager**: Only one in a system that performs data collection, configuration, control, licensing and can also be a Resource.
- ◆ A **Resource**: Network Traffic Generator (LANforge FIRE) and/or Network Emulator (LANforge ICE). More Resources = More Capacity.

System HW Features



- ◆ Form factor support: Compact Network Appliance, Near Silent Appliance, Shuttle PC, PC, Rack Mount Server, Laptop, Rugged Portable PC. Compact form factors good for customer demos, on-site support and desktop development. Other form factors give flexibility in deployment.



Compact Network Appliance



WiFi Compact Network Appliance



1U Rackmount Appliance



System HW Features



Compact Near Silent Appliance



Rugged Portable PC

- ◆ Interface support: 10/100/1000/10Gbe copper/fiber ethernet, 802.11a/b/g, T1/E1 and even Token Ring! Using generic interface HW allows cost effective reuse of LANforge investment.
- ◆ Speed support: 10 bps to 1 Gbps FDX, +1 Gbps available. Provides an affordable broad performance envelope.
- ◆ Sub-millisecond precision and accuracy attainable without the need for custom HW.

System SW Features



- ◆ Standard HW support x86-32/64 allows the use of COTS HW.
- ◆ Linux supported: FC2–8. Unofficially supported: SUSE, Debian and others. Customers can use an existing and familiar distribution to reduce the learning curve.
- ◆ Windows (minus Armageddon, VLANs, Virtual-Routers, NAT, DHCP) gives flexibility in deployments for existing platforms.
- ◆ Live-CD allows complete temporary installation of LANforge on any platform to increase the number of LANforge resources without additional investment in HW.
- ◆ JAVA based GUI that is GPL'd enables localization and customization.

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System SW Features



- ◆ Scriptable interface helps automate testing. Perl scripts provided free.
- ◆ Automated DB backup to preserve previous test configurations.
- ◆ Spreadsheets exported in standard CSV enable graphing of collected data for engineering analysis and management reports.
- ◆ Multiple users can share a LANforge system thereby leveraging investment. User administration feature prevents friendly fire.
- ◆ 802.1q VLAN trunking support allows LANforge to be shared lab resource through network architecture.

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System SW Features



- ◆ Remote sniffing of packets from any LANforge interface for efficient debugging of problems.
- ◆ MAC-VLANs (MAC spoofing) creates realistic endpoints each with their own routing table.

LANforge FIRE Features



- ◆ Abundance of simultaneously reported packet statistics, e.g. Tx Rate, Rx Rate, Rx Drop, Tx Bytes, Rx Bytes, Latency, Jitter, Ethernet Driver Counters, etc...
- ◆ Maximum configurable MAC-VLANs = Unlimited, Maximum 802.1q VLANs per Interface = 4094. Minimum of 400 simultaneous traffic passing VLANs.
- ◆ Multiprotocol support without additional licensing. Standard licensing includes L2, L3 and L4. Additional licensing required for VoIP, PESQ, Armageddon, Resources and Ports.
- ◆ Easily increase system capacity by adding more Resources. Maximum number of Resources is 144 per system.

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LANforge FIRE Features



- ◆ High physical port counts possible at low cost through 802.1q trunking combined with commodity ethernet switches.
- ◆ Below the orange ethernet cable is the 802.1q trunk between LANforge and the etherswitch. The ports on the etherswitch are now traffic generating LANforge FIRE ports.

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Model: CT570 – 24 port Last-Mile Traffic Generator

LANforge FIRE Features



- ◆ Over 2000 connections per Resource make LANforge FIRE suitable for testing high multiple traffic flows e.g. Firewall or SBC testing.
- ◆ IP ToS (QoS) supported per RFCs: 1349, 2474 and 2481.
- ◆ Standard networking stacks provide realistic traffic generation.
- ◆ WiFIRE provides 802.11a/b/g connectivity. Up to 31 Virtual STAs per WiFi NIC. 128bit WEP and WPA1 supported.
- ◆ Endpoints can be quiesced with variable timers for graceful termination of packet flow.

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LANforge FIRE Features



- ◆ Ports can be configured via DHCP for ease of configuration of test scenario.
- ◆ Extensive HTML reporting from CSV spreadsheets via GUI.
- ◆ .
- ◆ .
- ◆ .

LANforge FIRE VoIP



- ◆ SIP and H.323 supported.
- ◆ VoIP Endpoint can call a phone/UA or receive a call and record various statistics.
- ◆ Control of H.323 tunnelling and fast start supported.
- ◆ Call setup via gateway/proxy possible. Known to operate with Asterisk, SER, Broadsoft, Sonus and Lucent IMS.

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LANforge FIRE VoIP



- ◆ VAD/Silence Suppression configurable for delay and keep alive.
- ◆ Fixed Jitter Buffer depth configurable upwards of 20ms in 20ms increments.
- ◆ Jitter buffer reports: Silence Fill, Underrun, Overrun and Current Size.
- ◆ Signalling and RTP port configurable.

continued...

LANforge FIRE VoIP



- ◆ Voice Quality scoring by Opticom PESQ API via GUI. Additional quality statistics such as MOS-LQO, delay, attenuation, G.107, and others reported via CSV file.
- ◆ All RTCP statistics reported.
- ◆ Current maximum simultaneous call density with RTP per resource is 280 calls or 240 VoIP endpoints. Each endpoint is unique with it's own MAC address, IP address and routing table.
- ◆ Basic call scripting: Multi Call, Continuous Call, Number of Calls, Call Duration, Ring Time, Inter-Call Gap, Start Delay, Auto Generated URIs/Phone Numbers.

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LANforge FIRE VoIP



- ◆ Call statistics reported: Attempts, Answers, Completes, Cancels, Busy and Fails.
- ◆ SIP call failures reported with reason codes.
- ◆ Endpoints can perform signalling only and hence increase the number of simultaneous calls/VoIP endpoints/BHCA.
- ◆ Endpoints can replay custom audio files and record audio to file and play audio to speaker.
- ◆ Individual call log available for each endpoint.

LANforge FIRE Layer-4



- ◆ Feature allows http:// and ftp:// URLs to be accessed with multiple sessions and reporting.
- ◆ Support for four HTTP Authentication types (Basic, Digest, GSS, NTLM).
- ◆ Support for Proxy and three Proxy Authentication types (Basic, Digest, NTLM).
- ◆ SSL/HTTPS certification supported.
- ◆ Files can be uploaded or downloaded by an endpoint.

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LANforge FIRE Layer-4



- ◆ Single URL or list of URLs can be accessed by an endpoint.
- ◆ Connections can reuse TCP/IP ports or use new TCP/IP ports to cause additional stress.
- ◆ Support for caching proxies such as Squid.
- ◆ Over 28,000 URLs per second per Resource when reusing TCP/IP ports.
Over 13,000 URLs/sec/Resource without TCP/IP port reuse.
- ◆ Over 3000 HTTP simultaneous connections each with unique MAC and IP address per Resource.

LANforge FIRE Layer-4



- ◆ Maximum aggregate download speed over 980 Mbps on GigE.
- ◆ Maximum aggregate download speed 9.74 Gbps on 10GE.
- ◆ HTTP and FTP failures reported with reason code.

LANforge Generic (L4-7)



- ◆ Generic endpoints allow command line tools (CLI) to be managed, executed and reported.
- ◆ Built in CLI tools: ping, traceroute, DNS, SMTP, Telnet, Netcat, NMAP and bonnie++ (filesystem test tool e.g. NFS/SAMBA/iSCSI).
- ◆ Custom in-house CLI tools can be integrated into the LANforge FIRE Generic endpoint and reporting framework.
- ◆ 2000 NFS endpoints/clients per resource.

LANforge File I/O (L4-7)



- ◆ LANforge filesystem testing feature.
- ◆ Tests: NFS, iSCSI or SMB (SAMBA)
- ◆ Affords more control than the Generic Bonnie++ tool but does not provide as many options.
- ◆ Configurable for: RW Rate, RW Size, File Creation, File Sync, CRC Calculation and Custom Payloads.

LANforge Armageddon (L3)



- ◆ Accelerated UDP traffic generation feature that allows LANforge FIRE to generate traffic at 1 Gbps or more depending on HW.
- ◆ Packets can have rotating source and destination MAC addresses, IP ports and UDP ports. The combination of rotating ports and high speed significantly stresses network devices.
- ◆ Packets can have variable size and a set amount of packets can be sent at configured rate (PPS).
- ◆ Latency is reported with microsecond (μS) accuracy.
- ◆ Current maximum speed 5.5 Gbps sending to self.

LANforge FIRE Applications



- ◆ See website for applications.

LANforge FIRE Road Map



- ◆ Release 5.0.8 targeted availability August, 2008:
 - WPA2 support.
 - GUI front end for IMIX, SUT profiling and bulk traffic test scripts.
 - Support for POP3, P2P and iSCSI.

- ◆ Future Releases:
 - Optimized VoIP for increased call density
 - Dynamic Allocation/Deallocation of Resources via GUI
 - Advanced Reporting Enhancements: Realtime Graphing, Threshold Alarming
 - Improved HTML Reports

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LANforge FIRE Road Map



◆ Future releases:

- WiFIRE, support 802.11e WMM.
- Traffic generation using statistical profiles.
- User defined traffic profiles including rate, quantity and time.
- MMOG demo using FIRE to control generic MMOG client.
- Configurable packetization for RTP.
- Add GSM Codec.
- Dynamic association and removal of LANforge resources through CLI and GUI.
- Presentation of all OPTICOM PESQ API Statistics.
- Routing protocol traffic generation.
- Integrate VLC to enable video traffic generation for triple and multiplay testing.

Demo: Objective



- ◆ Illustrate basic LANforge FIRE and ICE functionality using a single appliance.
- ◆ Demonstration realized by using virtual re-direct devices (<http://lwn.net/Articles/130389/>) which can have more advanced applications such as routable ICE WAN emulation.
- ◆ Platform:
 - <PUT SPECS HERE>

Demo: References



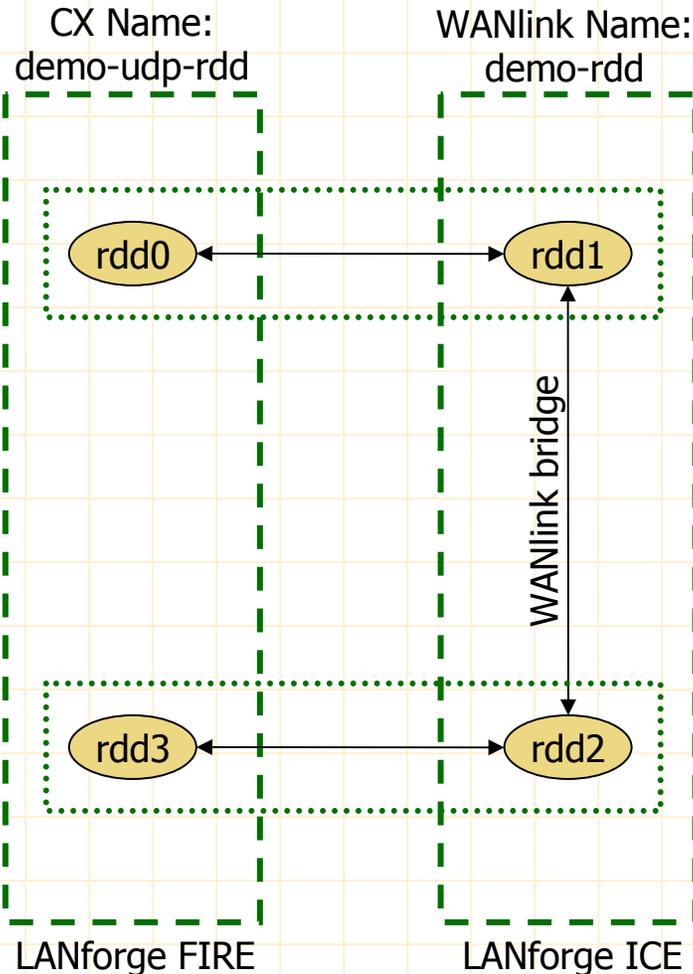
- ◆ Online: <http://www.candelatech.com/doc.html>
- ◆ HELP button ☺
- ◆ Symbol ">" is a mouseActionClick
- ◆ Definition of Virtual Re-Direct Device:
 - RDDs (Re-Direct Devices) are created and associated in pairs. Transmitting a packet on one RDD cause the other RDD to receive the packet. RDDs are presented as regular ethernet devices and have MACs, will do ARP, and other such things.

Demo: UDP Cross Connect



rdd0:
IPAddress: 1.1.1.1/24
Name: demo-udp-rdd-A
TXSpeed: 1.024 Mbps
PacketSize: 300 bytes
PldPattern: Increasing

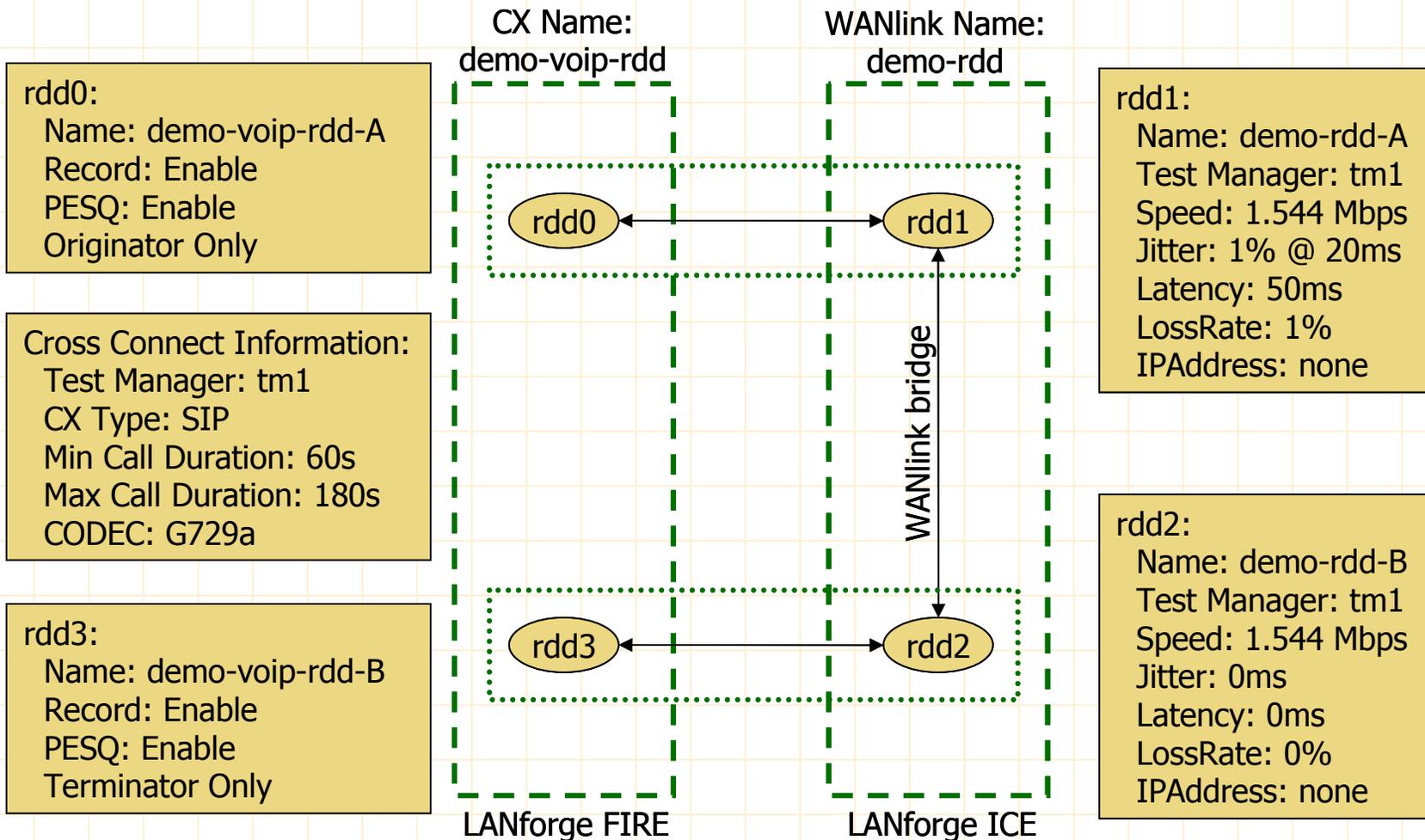
rdd3:
IPAddress: 1.1.1.2/24
Name: demo-udp-rdd-B
TXSpeed: 1.024 Mbps
PacketSize: 300 bytes
PldPattern: Increasing



rdd1:
Name: demo-rdd-A
Test Manager: tm1
Speed: 1.544 Mbps
Jitter: 1% @ 20ms
Latency: 50ms
LossRate: 1%
IPAddress: none

rdd2:
Name: demo-rdd-B
Test Manager: tm1
Speed: 1.544 Mbps
Jitter: 0ms
Latency: 0ms
LossRate: 0%
IPAddress: none

Demo: VoIP Cross Connect



Demo: Connect to LANforge



- ◆ >Discover, >Connect

- ◆ >Server Name/IP: [yourLANforge]:4002, >Connect

- ◆ >Control, >Connect

- ◆ Status:
 - Blue = Management Interface
 - Green = Running Resource Interface
 - Yellow = Phantom Resource Interface
 - Link State and Negotiation

Demo: Create rdds



- ◆ >Port Mgr, >Create, >Redirect, >First Redir Name: rdd0, >Second Redir Name: rdd1, >OK
- ◆ >Create, >Redirect, >First Redir Name: rdd2, >Second Redir Name: rdd3, >OK
- ◆ >Alias: rdd0, >Modify, >IP Address: 1.1.1.1, >IP Mask: 255.255.255.0, >OK
- ◆ >Alias: rdd3, >Modify, >IP Address: 1.1.1.2, >IP Mask: 255.255.255.0, >OK

Demo: Create Test Mgr



- ◆ >Test Mgr, >Create, >Test Manager Name: tm1
- ◆ >Free Clients: default_gui, >Add Client
- ◆ >Free Clients: default, >Add Client
- ◆ >OK

Demo: Create WANlink



- ◆ >WanLinks, >Create
- ◆ >Name: demo-rdd, >Test Manager: tm1
- ◆ demo-rdd-A, >Port: rdd1, >Jitter-Freq: 10000, >Transfer Rate: 1544000, >Latency: 100, >Jitter: 20, Drop-Freq: 1000, >Kernel-Mode
- ◆ demo-rdd-B, >Port: rdd2, >Transfer Rate: 1544000, >Kernel-Mode

Demo: Create UDP CX



- ◆ >Layer-3, >Create
- ◆ >CX Name: demo-udp-rdd, CX Type: LANforge/UDP, >Test Manager: tm1
- ◆ demo-rdd-A, >Port: rdd1, >Jitter-Freq: 10000, >Transfer Rate: 1544000, >Latency: 100, >Jitter: 20, Drop-Freq: 1000, >Kernel-Mode
- ◆ demo-rdd-B, >Port: rdd2, >Transfer Rate: 1544000, >Kernel-Mode

Demo: Create VOIP CX



- ◆ >VOIP/RTP, >Create
- ◆ >CX Name: demo-voip-rdd, >Test Manager: tm1, >CX Type: Voice – SIP, >Min Call Duration: 60, >Max Call Duration: 180, >Codec: G729a
- ◆ demo-voip-rdd-A, >Port: rdd0, >Record, >Enable PESQ
- ◆ demo-voip-rdd-B, >Port: rdd3, >Record, >Enable PESQ

Demo: Miscellaneous



- ◆ Poll Mgr
- ◆ Resource Mgr

Specifications



- ◆ Product Matrix coming soon...

Pricing



◆ Please contact your Distributor:

or Candela Technologies Sales:

sales@candelatech.com

Thank You!