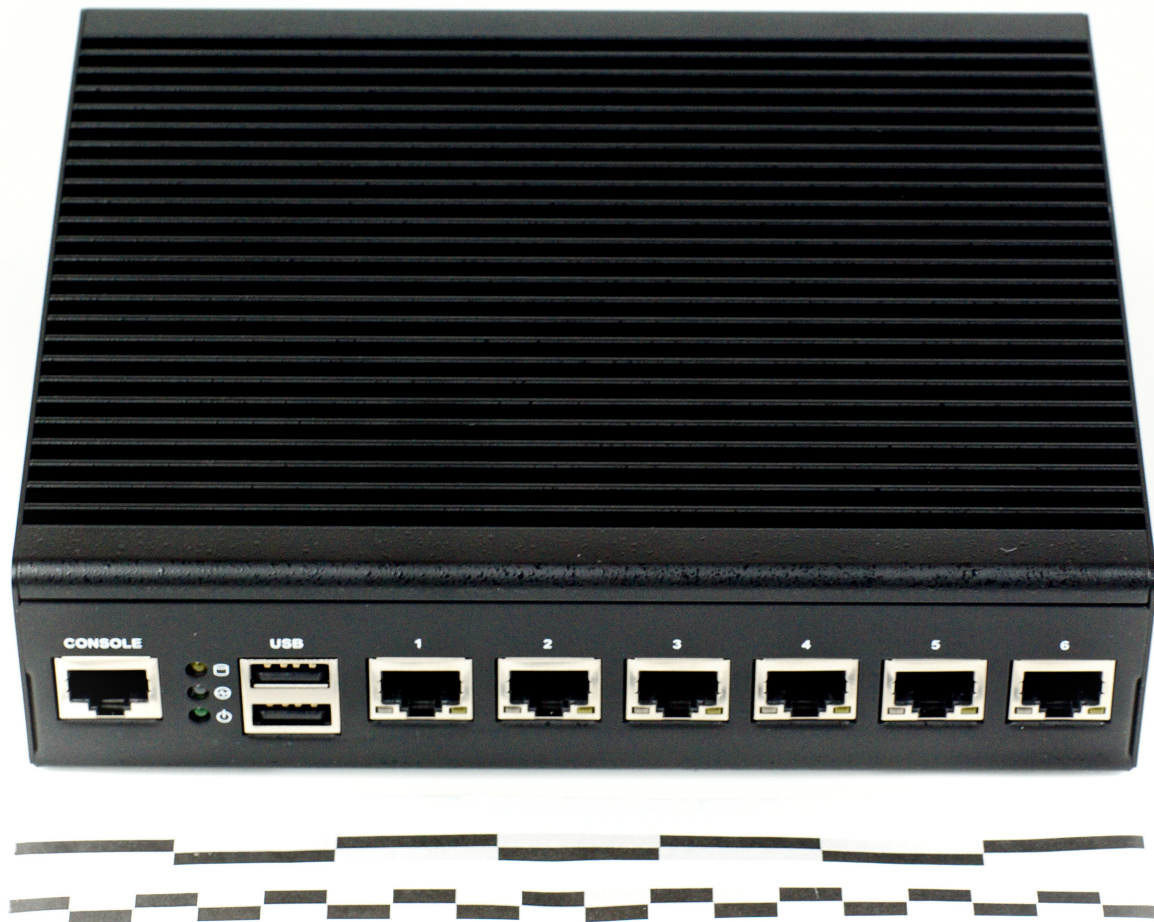


## CT922 LANforge-ICE 155 Mbps WAN Emulator

The CT922 is an excellent choice for a portable network emulator supporting speeds up to 155 Mbps (bi-directional). The CT922 will fit into a small travel bag or briefcase for easy portability. It is also completely silent, so you can include it in your customer demos and presentations. Additional software licenses can enable additional WanLinks or higher-speed emulations for future upgrades. No additional hardware or software is required, but it is suggested that you manage the system using the LANforge-GUI on a separate machine. The CT922 can also be managed over a serial console in text mode.

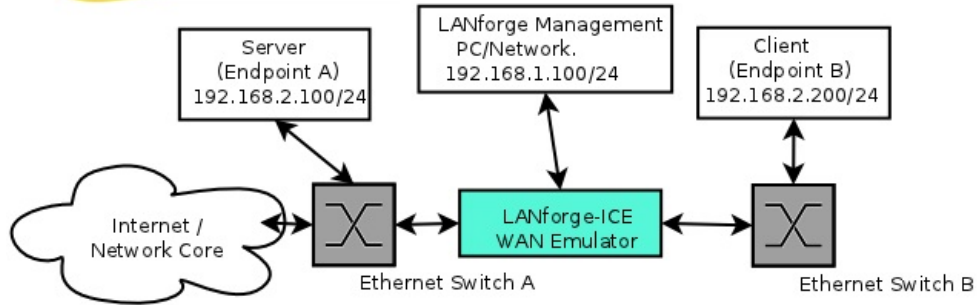




NOTE: This product may have a different hardware configuration than the system pictured above.  
Refer to your official quote for details.

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## Example Network Diagram



This diagram shows how one might use LANforge ICE to emulate a Wide Area Network between a Server and Client. When the Client communicates with the Server, the traffic will flow through the Ethernet switches and then through LANforge ICE. LANforge ICE will enforce the rate limitation and other network emulation as configured. The Client and Server are on the same subnet. For a simpler configuration, the Client and Server can be directly connected to the LANforge ICE system.

### Quick Start Guide

1. Connect Management Ethernet port to Management network or management PC.
2. Connect Client to eth0 and Server to eth1. The eth0 <-> eth1 interfaces will be bridged and this bridge will inject the network emulation.
3. Connect power brick to standard US or European AC power source.
4. Install the LANforge-GUI on a separate management PC or Laptop. Windows and Linux GUIs are supported: Select the correct one from the CDROM, Candela Technologies Download page or by connecting a browser to the unit and install GUI.
5. The CT922 should now boot. If DHCP is enabled on the Management network, the CT922 will automatically acquire an IP address. If DHCP is not available, the IP address will be set to 192.168.1.101 by the LANforge scripts.
6. Start the LANforge GUI on the management PC and click the 'Discover' button. It should find the CT922 appliance and add the IP address to the drop-down box in the Connect widget. Press 'Connect' and you will be connected to the CT922.
7. Select the WanLinks tab in the GUI. One of the preconfigured tests should already be running. You may double-click the row in the top section to modify the configuration. You can also view a real-time report of the test with the 'Display' button. Any modifications take place immediately after you click 'Submit'.

## LANforge-ICE Related Screen Shots

### WanLinks Tab



LANforge Manager Version(5.2.4)

Control Reporting Tear-Off Help

Stop All Restart Manager Refresh HELP

Layer-4 Generic Test Mgr Resource Mgr Serial Spans PPP-Links Event Log Alerts Port Mgr Messages

Status Layer-3 L3 Endps VoIP/RTP VoIP/RTP Endps Armageddon WanLinks Collision-Domains File-IO

Rpt Timer: fast (1 s) Go Test Manager all

Select All Start Switch Stop Clear

Display Create Modify Batch Modify Delete

**WanLinks for Selected Test Manager**

| Name         | EID  | K-M | State | Endpoints (A <-> B) | Pkt Tx A->B | Pkt Tx A<-B | Rate A->B     | Rate A<-B     | Rpt Timer |
|--------------|------|-----|-------|---------------------|-------------|-------------|---------------|---------------|-----------|
| VRWL-1.1.000 | 6.22 | ✓   | Run   | VRWL-1.1.000-A ...  | 565,080     | 439,422     | 1,000,000,000 | 1,000,000,000 | 1.00      |
| VRWL-1.1.001 | 6.3  | ✓   | Run   | VRWL-1.1.001-A ...  | 4,054,185   | 3,658,228   | 1,000,000,000 | 1,000,000,000 | 1.00      |
| VRWL-1.1.002 | 6.2  | ✓   | Run   | VRWL-1.1.002-A ...  | 18,632      | 18,593      | 44,736,000    | 44,736,000    | 1.00      |
| VRWL-1.1.003 | 6.4  | ✓   | Run   | VRWL-1.1.003-A ...  | 3,657,007   | 4,040,390   | 1,000,000,000 | 1,000,000,000 | 1.00      |

**All WanLink Endpoints**

| WPs | Name          | Run | Script  | Max Rate      | Tx Pkts   | Rx Pkts   | Tx Rate   | Tx Drop % | Dropped | Tx-Failed | Failed-Late | TX Bytes     |
|-----|---------------|-----|---------|---------------|-----------|-----------|-----------|-----------|---------|-----------|-------------|--------------|
| +   | VRWL-1.1.0... | ✓   | Stopped | 1,000,000,... | 439,422   | 565,088   | 1,014,228 | 0         | 0       | 0         | 0           | 653,589,...  |
| +   | VRWL-1.1.0... | ✓   | Stopped | 1,000,000,... | 565,080   | 439,434   | 1,020,730 | 0         | 0       | 9         | 0           | 843,838,...  |
| +   | VRWL-1.1.0... | ✓   | None    | 1,000,000,... | 3,658,228 | 4,054,215 | 69,677    | 0         | 0       | 0         | 0           | 782,190,...  |
| +   | VRWL-1.1.0... | ✓   | None    | 1,000,000,... | 4,054,185 | 3,658,203 | 77,642    | 0         | 0       | 0         | 0           | 866,984,...  |
| +   | VRWL-1.1.0... | ✓   | None    | 44,736,000    | 18,593    | 18,613    | 85,816    | 0         | 0       | 0         | 0           | 3,980,56,... |
| +   | VRWL-1.1.0... | ✓   | None    | 44,736,000    | 18,632    | 18,612    | 85,849    | 0         | 0       | 0         | 0           | 3,988,51,... |

Logged in to: 192.168.100.138:4002 as: Admin

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## WanLink Display

WanLink Display: VRWL-1.1.000 Manager: brent-6port

Endpoint: VRWL-1.1.000-A (1.1.9.65)

Endpoint: VRWL-1.1.000-B (1.1.11.66)

30-sec Averages

WAN Speed: 128 Kbps TX Rate: 128.124 Kbps  
 RX Rate: 130.572 Kbps TX Pkts: 981  
 Dropped: 0 Duplicated: 0  
 Reordered: 0 TX Failed: 0

4.295 Gbps  
 16.777 Mbps  
 65.526 Kbps  
 256 bps  
 0 bps  
 128 Kbps  
 96 Kbps  
 64 Kbps  
 32 Kbps  
 0 bps

Rx Bytes Dropped [Record-Dropped]  
 Rx Throughput [Recorded]

129 KB Backlog

30-sec Averages

WAN Speed: 128 Kbps TX Rate: 127.734 Kbps  
 RX Rate: 140.298 Kbps TX Pkts: 1100  
 Dropped: 0 Duplicated: 0  
 Reordered: 0 TX Failed: 0

4.295 Gbps  
 16.777 Mbps  
 65.526 Kbps  
 256 bps  
 0 bps  
 128 Kbps  
 96 Kbps  
 64 Kbps  
 32 Kbps  
 0 bps

Rx Bytes Dropped [Record-Dropped]  
 Rx Throughput [Recorded]

129 KB Backlog

**WanPaths for WanLink Endpoint: VRWL-1.1.000-A**

| Name | Tx Rate | Disabled | ! | IF | Filter Pattern | Tx Pkts | Rx Pkts | TX Bytes | RX Bytes | Dropped | Dup Pkts | OOO Pkts | Co |
|------|---------|----------|---|----|----------------|---------|---------|----------|----------|---------|----------|----------|----|
|------|---------|----------|---|----|----------------|---------|---------|----------|----------|---------|----------|----------|----|

**WanPaths for WanLink Endpoint: VRWL-1.1.000-B**

| Name | Tx Rate | Disabled | ! | IF | Filter Pattern | Tx Pkts | Rx Pkts | TX Bytes | RX Bytes | Dropped | Dup Pkts | OOO Pkts | Co |
|------|---------|----------|---|----|----------------|---------|---------|----------|----------|---------|----------|----------|----|
|------|---------|----------|---|----|----------------|---------|---------|----------|----------|---------|----------|----------|----|

Display Selected Paths  Pause Display Print Modify Stop Refresh Clear Close

## Create/Modify WanLink Window

Apply OK Display WanLink & WanPaths Cancel

**1** WanLink Information

Name:

Presets:

| Endpoint A  | Endpoint B                                     |
|---|--|
| Port: <input type="text" value="25 (oddVR14b)"/>              | <input type="text" value="27 (oddVR15b)"/>     |
| Transfer Rate: <input type="text" value="11 ( 1.544 Mbps )"/> | <input type="text" value="11 ( 1.544 Mbps )"/> |
| Delay: <input type="text" value="zero (0 us)"/>               | <input type="text" value="zero (0 us)"/>       |
| Drop-Freq: <input type="text" value="zero (0%)"/>             | <input type="text" value="zero (0%)"/>         |
| Jitter: <input type="text" value="zero (0 us)"/>              | <input type="text" value="zero (0 us)"/>       |
| Jitter-Freq: <input type="text" value="zero (0%)"/>           | <input type="text" value="zero (0%)"/>         |

**2** WanLink Information

Pass-Through  HW Pass-Through

Coupled-Mode  Kernel-Mode

Resource:

Rpt Timer:

| Endpoint A  | Endpoint B   |
|---|--|
| Reorder-Freq: <input type="text" value="zero (0%)"/>                                | <input type="text" value="zero (0%)"/>                                 |
| Dup-Freq: <input type="text" value="zero (0%)"/>                                    | <input type="text" value="zero (0%)"/>                                 |
| Drop Burst: min <input type="text" value="1"/> max <input type="text" value="1"/>   | min <input type="text" value="1"/> max <input type="text" value="1"/>  |
| Reorder Amt: min <input type="text" value="1"/> max <input type="text" value="20"/> | min <input type="text" value="1"/> max <input type="text" value="20"/> |

**3** Endpoint A WAN Paths

| Name | Tx Rate | Disabled                 | !                        | Filter Pattern                 | Delay |
|------|---------|--------------------------|--------------------------|--------------------------------|-------|
| wp1  | 1.544 M | <input type="checkbox"/> | <input type="checkbox"/> | Src: 0.0.0.0/0 Dest: 0.0.0.0/0 | 50    |

Endpoint B WAN Paths

| Name | Tx Rate | Disabled | ! | Filter Pattern | Delay |
|------|---------|----------|---|----------------|-------|
|      |         |          |   |                |       |

**4** WanLink Information

CPU-ID:

Replay File:

| Endpoint A   | Endpoint B   |
|--|--|
| <input type="checkbox"/> ICEcap Replay               | <input type="checkbox"/> ICEcap Replay               |
| Dir: <input type="text"/>                            | Dir: <input type="text"/>                            |
| <input checked="" type="checkbox"/> Loop Replay      | <input checked="" type="checkbox"/> Loop Replay      |
| <input checked="" type="checkbox"/> Replay Latency   | <input checked="" type="checkbox"/> Replay Latency   |
| <input checked="" type="checkbox"/> Replay Loss      | <input checked="" type="checkbox"/> Replay Loss      |
| <input checked="" type="checkbox"/> Replay Dup       | <input checked="" type="checkbox"/> Replay Dup       |
| <input checked="" type="checkbox"/> Replay Bandwidth | <input checked="" type="checkbox"/> Replay Bandwidth |

Test Manager:

Dump File:

Force Packet Gap  Force Packet Gap

Drop-Xth  Drop-Xth

Reorder-Xth  Reorder-Xth

QDisc:

Max Lateness:

Backlog Buffer:

|                     | Endpoint A  | Endpoint B  |                     | Endpoint A  | Endpoint B  |
|---------------------|---|---|---------------------|---|---|
| Corruption: 1 Rate: | <input type="text" value="0"/>  | <input type="text" value="0"/>  | Corruption: 4 Rate: | <input type="text" value="0"/>  | <input type="text" value="0"/>  |
| Corruption:         | <input type="text" value="Random Write"/>                             | <input type="text" value="Random Write"/>                             | Corruption:         | <input type="text" value="Random Write"/>                             | <input type="text" value="Random Write"/>                             |
| Byte-to-Write:      | <input type="text" value="0"/>  | <input type="text" value="0"/>  | Byte-to-Write:      | <input type="text" value="0"/>  | <input type="text" value="0"/>  |
| Range Offset        | min <input type="text" value="0"/> max <input type="text" value="0"/> | min <input type="text" value="0"/> max <input type="text" value="0"/> | Range Offset        | min <input type="text" value="0"/> max <input type="text" value="0"/> | min <input type="text" value="0"/> max <input type="text" value="0"/> |
|                     | <input type="checkbox"/> Chain-to-Next                                | <input type="checkbox"/> Chain-to-Next                                |                     | <input type="checkbox"/> Chain-to-Next                                | <input type="checkbox"/> Chain-to-Next                                |
|                     | <input type="checkbox"/> Checksum                                     | <input type="checkbox"/> Checksum                                     |                     | <input type="checkbox"/> Checksum                                     | <input type="checkbox"/> Checksum                                     |

## Software Features

1. General purpose WAN and Network impairment emulator.
2. Able to simulate DS1, DS3, OC-3, DSL, CableModem, satellite links and other rate-limited networks, from 10 bps up to 155 Mbps (full duplex).
3. Can modify various network attributes including: network-speed, latency, jitter, packet-loss, packet-reordering, and packet-duplication.
4. Supports Packet corruptions, including bit-flips, bit-transposes and byte-overwrites.
5. Supports WanPath feature to allow configuration of specific behavior between different IP subnets, MAC addresses or other packet filters using a single pair of physical interfaces. WanPath support may require purchase of additional WanPath licenses, please ask your sales contact for more information.
6. Supports routed and bridged mode for more flexibility in how you configure your network and LANforge-ICE.
7. Supports WAN emulation across virtual 802.1Q VLAN interfaces more efficient use of limited physical network interfaces.
8. Supports 'WAN-Playback' allowing one to capture the characteristics of a live WAN and later have LANforge-ICE emulate those captured characteristics. The playback file is in XML format, and can be easily created by hand or with scripts. The free LANforge-ICEcap tool can be used to probe networks and automatically create the XML playback file.
9. Allows packet sniffing and network protocol decoding with the integrated [Wireshark](#) protocol sniffer.
10. Includes comprehensive management information detailing all aspects of the LANforge system including processor statistics, test cases, and Ethernet port statistics.
11. GUI runs as Java application on Linux, MAC and Microsoft Operating Systems (among others).
12. GUI can run remotely, even over low-bandwidth links to accommodate the needs of the users.
13. Central management application can manage multiple units, tests, and testers simultaneously.
14. Includes easy built-in scripting to automatically iterate through bandwidth, latency and other settings. Advanced programmatic scripting over a TCP socket also supported and example perl libraries and scripts are included.
15. Automatic discovery of LANforge resources simplifies maintenance and configuration of LANforge test equipment.

## Hardware Specification

1. Midrange Appliance with no moving parts.
2. Operating System: 64-bit Fedora Linux with customized Linux kernel.
3. 6 1Gbps Ethernet ports.
4. 1.74 GHz Quad Core Intel Atom C2518 processor.
5. RJ45 Serial console (115200 8 N 1) for console management & initial configuration.
6. 4 GB RAM.
7. 30+ GB Solid State Hard Drive.
8. Larger storage drive available.
9. +12v 5AMP external power supply (brick).
10. Weight: 3.3 lbs or 1.5 kg.
11. Dimensions: 7 x 6 x 1.75 inches Metric: 180 x 145 x 45 mm.
12. Operating Temperature: 0 ~ 40°C.

13. Operating Humidity: 5 ~ 95%.

14. Certification: CE Emission, FCC Class A, RoHS Compliant.

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## Additional Feature Upgrades

Unless otherwise noted in the product description, these features usually cost extra:

- WanPaths (LANforge-ICE feature set)
- Virtual Interfaces: MAC-VLANs, 802.1Q VLANs, WiFi stations, etc
- LANforge FIRE traffic generation.
- VOIP: Each concurrent call over the included package requires a license.
- VoIP-Mobile Audio Quality Testing using POLQA/PESQ.
- Mobile-Mobile Audio Quality Testing using POLQA/PESQ.
- Armageddon: Each pair of ports requires a license if not already included.
- RF Chambers for WiFi testing.
- External battery pack: 12+ hours for CT520, CT523, CT92X and other platforms.

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