

# 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.





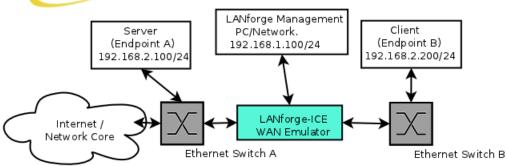
NOTE: This product may have a different hardware configuration than the system pictured above. Refer to your official quote for details.

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## **Example Network Diagram**



## LANforge ICE 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'.

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# LANforge-ICE Related Screen Shots

WanLinks Tab

	LANforge Ma	nager Ver	sion(5.2.4)					_ = ×
<u>C</u> ontrol <u>R</u> eporting <u>T</u> ear-Off Help								
			Stop All	Restar	Manager		Refresh	HELP
					v a sta v			
	source Mgr   Serial Span					Message		51.0
Status   Layer-3   L3 Endps	VoIP/RTP VoIP/	RTP Endps	Armaged	idon wa	nLinks (	ollision-	Domains	File-IO
Rpt Timer: fast (1 s) 🔻 Go	Test Manager all	-	Se	lect All	Start Swi	tch	Stop C	lear
	Hide Stopped		Display	Create	Modify	Batch	n Modify	Delete
		nks for Selec	ted Test Mar	nager				
Name EID K-M State	Endpoints (A <->	B) Pkt Tx A	A->B Pk	t Tx A<-B	Rate A->B	Ra	te A<−B	Rpt Timer
VRWL-1.1.000 6.22 🖌 Run	VRWL-1.1.000-A	. 5	65,080	439,422	1,000,000,0	00 1,0	00,000,000	1,00 🔺
VRWL-1.1.001 6.3 🗹 Run	VRWL-1.1.001-A	. 4,0	54,185	3,658,228	1,000,000,0	00 1,0	00,000,000	1,00 =
VRWL-1.1.002 6.2 🗹 Run	VRWL-1.1.002-A		18,632	18,593	44,736,0	00	44,736,000	1,00
VRWL-1.1.003 6.4 🗹 Run	VRWL-1.1.003-A	. 3,6	57,007	4,040,390	1,000,000,0	00 1,0	00,000,000	1,00 -
•								•
, 								
		All WanLink	•					
WPs Name Run Script	Max Rate Tx Pkts	Rx Pkts	Tx Rate	Tx Drop %			Failed-Late	TX Bytes
+ VRWL-1.1.0 🗹 Stopped	1,000,000, 439,422			0	0	0		653,589, 🔺
+ VRWL-1.1.0 🖌 Stopped	1,000,000, 565,080			0	0	9		843,838, =
+ VRWL-1.1.0 🗹 None	1,000,000, 3,658,228		69,677	0	0	0		782,190,
+ VRWL-1.1.0 🗹 None	1,000,000, 4,054,185	, ,	77,642	0	0	0		866,984,
+ VRWL-1.1.0 🗹 None	44,736,000 18,593	· · · ·	85,816	0	0	0	0	
+ VRWL-1.1.0 🗹 None	44,736,000 18,632	18,612	85,849	0	0	0	0	3,988,519 🗸
								•
Logged in to: 102169100129:4002								

Logged in to: 192.168.100.138:4002 as: Admin

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WanLink Display

🙆 WanLink Display: VRWL-1.1.00		
Endpoint: VRWL-1.1.000-A (1.1.9.65)	Endpoint: VRWL-1.1.000-B (1.1.11.66)	
32 KB WAN Speed: 128 Kbps TX Rate: 128.124 Kbps RX Rate: 130.572 Kbps TX Pkts: 981 Dropped: 0 Duplicated: 0	✓ 30-sec Averages WAN Speed: 128 Kbps TX Rate: 127.734 Kbps RX Rate: 140.298 Kbps TX Pkts: 1100 Dropped: 0 Duplicated: 0	45 KB
Reordered: 0 TX Failed: 0	Reordered: 0 TX Failed: 0	
4.295 Obps 16.777 Mbps - 65.536 Kbps - 256 bps -	4.295 Obps - 16.777 Mbps - 65.536 Kbps - 256 bps	
Rx Bytes Dropped [Record-Dropped]	Rx Bytes Dropped [Record-Dropped]	
128 Kbps - 96 Kbps -	128 Kbps 96 Kbps	
64 Kbps -	— 64 Кырз	
32 Kbps -	— 32 Kbps	129 KB
129 KB 0 bps Backlog Rx Throughput (Recorded)		129 KB Backlog
Name Tx Rate Disabled ! !F Filter Pattern	Endpoint: VRWL-1.1.000-A   Tx Pkts   Rx Pkts   TX Bytes   RX Bytes   Dropped   Dup Pkts   OG	00 Pkts Co
	1	
) <u></u>	Endpoint: VRWL-1.1.000-B	
Name Tx Rate Disabled ! !F Filter Pattern	TX Pkts RX Pkts TX Bytes RX Bytes Dropped Dup Pkts 00	
	TX FKIS   M FKIS   IX Byles   M Byles   Didpped   Ddp FKIS   Di	JU PRIS CU
		•
Display Selected Paths Pause Display Print	Modify Stop Refresh Clear	Close

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Create/Modify WanLink Window

			VRWL-1.1.009 - Crea	ate/Modify WanLin	k	_ 0
+ - All				А	pply OK Display	WanLink & WanPaths Cance
Name: Presets:	WanLink Information VRWL-1.1.009 CUSTOM			- 2	WanLink Information Pass-Through Coupled-Mode	HW Pass-Through
				Resource:	1 (lec2010-ath9k-1)	<b>•</b>
Port:	Endpoint A 25 (rddVR14b)	-	Endpoint B 27 (rddVR15b)	, Rpt Timer:	fast (1 s)	<b>~</b>
Transfer Rate:	Γ1 ( 1.544 Mbps )		Γ1 (1.544 Mbps) 🔻		Endpoint A	Endpoint B
Delay:	zero (O us)	-	zero (O us) 🔻	Reorder-Freq:		zero (0%)
Drop-Freq:	zero (0%)	-	zero (0%) 🗸	Dup-Freq:	zero (0%)	🕶 zero (0%) 💌
Jitter:	zero (O us)	-	zero (O us) 🗸	Drop Burst:	min 1 max 1	min 1 max 1
Jitter-Freq:	zero (0%)	-	zero (0%) 🗸	Reorder Amt:	min 1 max 20	min 1 max 20
			·		Script	Script
8	Endpoint A				Endpoint B WAN	
	te-WP Modif	fy-W		lav Name Tx	-WP Modify-W	P Delete-WP Filter Pattern Delay
Lorenta de la constancia de la constanci						<b>•</b>
	WanLink Information			-	WanLink Information	
CPU-ID:	WanLink Information			Test Manager:	WanLink Information default_tm	<b>•</b>
CPU-ID:	WanLink Information		Endpoint B	Test Manager:		Endpoint B Dump Packets
CPU-ID: Replay File:	0 Endpoint A DICEcap Replay		ICEcap Replay	Test Manager: Dump File:	default_tm Endpoint A Dump Packets	Endpoint B Dump Packets
	0 Endpoint A ☐ ICECap Replay Dir ☑ Loop Replay	-	Dir		default_tm Endpoint A Dump Packets Force Packet Gap Drop-Xth	Endpoint B Dump Packets Force Packet Gap Drop-Xth
	0 Endpoint A ICEcap Replay Dir V Loop Replay Replay Latency	-	Dir		default_tm Endpoint A Dump Packets	Endpoint B Dump Packets
	0 Endpoint A ICECap Replay Dir V Loop Replay Replay Latency Replay Loss V Replay Dup	-		Dump File:	default_tm Endpoint A Dump Packets Force Packet Gap Drop-Xth Reorder-Xth	Endpoint B Dump Packets Force Packet Gap Drop-Xth Reorder-Xth
	0 Endpoint A ICEcap Replay Dir V Loop Replay V Replay Latency V Replay Loss	-	☐ IČEcap Replay Dir ✓ Loop Replay ✓ Replay Latency ✓ Replay Loss	Dump File:	default_tm Endpoint A Dump Packets Force Packet Gap Drop-Xth Reorder-Xth FIFO	Endpoint B Dump Packets Force Packet Gap Drop-Xth Reorder-Xth FIFO
Replay File:	0 Endpoint A ICEcap Replay Dir PLoop Replay Replay Latency Replay Loss PReplay Dup PReplay Dup Replay Bandwidth	-	Dir Dir V Loop Replay V Replay Latency V Replay Loss V Replay Dup V Replay Bandwidth	Dump File: QDisc Max Lateness: Backlog Buffer:	default_tm Endpoint A Dump Packets Force Packet Gap Drop-Xth Reorder-Xth FIFO AUTO AUTO V	Endpoint B Dump Packets Force Packet Gap Drop-Xth Reorder-Xth FIFO AUTO AUTO
Replay File:	0 Endpoint A ICECap Replay Dir V Loop Replay Replay Latency Replay Loss V Replay Dup	-		Dump File: QDisc Max Lateness: Backlog Buffer: Corruption: 4	default_tm Endpoint A Dump Packets Force Packet Gap Drop-Xth Reorder-Xth FIFO AUTO	Endpoint B Dump Packets Force Packet Gap Drop-Xth Reorder-Xth FIFO AUTO
Replay File: Corruption: 1 Rate:	0 Endpoint A ICEcap Replay Dir V Loop Replay Replay Latency Replay Loss P Replay Dup Replay Bandwidth Endpoint A	-	Dir Dir Loop Replay V Replay Latency V Replay Latency V Replay Loss V Replay Dup V Replay Bandwidth	Dump File: QDisc Max Lateness: Backlog Buffer: Corruption: 4 Rate:	default_tm       Endpoint A       Dump Packets       Force Packet Gap       Drop-Xth       Reorder-Xth       FIFO       AUTO       AUTO       Endpoint A	Endpoint B Dump Packets Force Packet Gap Drop-Xth Reorder-Xth FIFO AUTO AUTO T Endpoint B O
Replay File: Corruption: 1 Rate: Corruption:	0 Endpoint A ☐ ICEcap Replay Dir ▷ Loop Replay ▷ Replay Latency ▷ Replay Loss ▷ Replay Dup ▷ Replay Bandwidth Endpoint A 0		ICEcap Replay  Dir  Loop Replay  Replay Latency Replay Loss Replay Dup Replay Bandwidth  Endpoint B 0	Dump File: QDisc Max Lateness: Backlog Buffer: Corruption: 4 Rate: Corruption:	default_tm Endpoint A Dump Packets Force Packet Gap Drop-Xth Reorder-Xth FIFO AUTO AUTO Endpoint A O	Endpoint B Dump Packets Force Packet Gap Drop-Xth Reorder-Xth FIFO AUTO AUTO T Endpoint B O
Replay File: Corruption: 1 Rate:	0 Endpoint A ☐ ICEcap Replay Dir ▷ Loop Replay ▷ Replay Latency ▷ Replay Loss ▷ Replay Dup ▷ Replay Bandwidth Endpoint A 0		ICEcap Replay  Dir  Loop Replay  Replay Latency Replay Loss Replay Dup Replay Bandwidth  Endpoint B 0	Dump File: QDisc Max Lateness: Backlog Buffer: Corruption: 4 Rate:	default_tm Endpoint A Dump Packets Force Packet Gap Drop-Xth Reorder-Xth FIFO AUTO AUTO Endpoint A O	Endpoint B Dump Packets Force Packet Gap Drop-Xth Reorder-Xth FIFO AUTO AUTO T Endpoint B O

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## **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:  $0 \sim 40^{\circ}$ C.
- 13. Operating Humidity: 5 ~ 95%.
- 14. Certification: CE Emission, FCC Class A, RoHS Compliant.

## **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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