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CT522-128 LANforge WiFIRE Chromebook 802.11a/b/g/n WiFi Traffic Generator with 128 Virtual STA Interfaces

The CT522-128 wireless traffic generator is an excellent choice for testing Access Points and other WiFi networks. The chassis is a Chromebook with single WiFi radio. The radio's max theoretical speed is 450 Mbps (3x3 MIMO). The CT522-128 uses a modified Wireless driver for WiFi NICs based on the Atheros chipset. It can support up to 128 Virtual Stations. Each of the Virtual Stations has its own IP address, IP port space, MAC address and routing table. The Virtual Stations can be assigned to communicate to a particular Access Point, use a particular SSID, and have a WEP (64 or 128bit) or WPA/WPA2 key assigned. The radio supports 802.11 a, b, g or n mode. The radio's frequency and Tx-Power can also be configured.

There is a single WiFi radio per CT522-128 but multiple CT522-128 systems or any other CT52x systems can be clustered together for more realistic radio interference patterns and increased traffic generation capability. Clustering and management can be performed over an auxiliary 2.4 GHz 802.11 b/g/n USB WiFi NIC (as shown in picture) as well as the built-in Ethernet port.

All virtual stations must be on the same frequency, but as long as the protocol supports that frequency, the multiple protocols can be used concurrently. For instance, if the radio is configured for a 2.4Ghz channel, the stations can be b, g, or n. If the radio is on a 5Ghz channel, the stations can be a or n. The bandwidth can be configured for all protocols. For 802.11n and 802.11AC, configuring the MCS rates also determines the number of spatial streams (1x1, 2x2, etc).

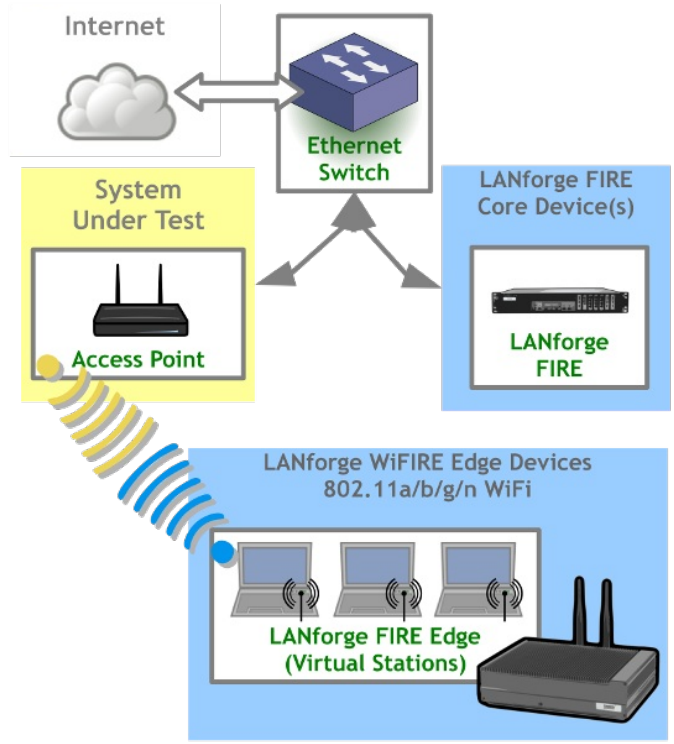
The Virtual Stations may be configured with all of the virtual interfaces on the same subnet, or different subnets, depending on the testing requirements. When used with something like VoIP, it allows all of the VoIP calls to use the standard IP ports (with one call per virtual interface).

The CT522-128 will fit into standard laptop carrying cases for easy portability. No additional hardware or software is required, but you may wish to manage the system using the LANforge GUI on a separate machine.

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

Example Network Diagram

LANforge WiFIRE
Virtual Station Traffic Generator



LANforge WiFIRE supports 802.11 Virtual Stations and Access Points*. To the System Under Test, it appears as if there are multiple PCs sitting inside the LANforge system generating independent traffic streams over Wireless NICs.

Many Virtual Station interfaces are supported per LANforge WiFIRE machine. LANforge can send traffic from one physical interface on the local machine to another interface on that same machine. Each physical and virtual interface can be configured on the same, or on different IP subnets.

In the configuration on the left, the LANforge FIRE Core can be one physical Ethernet interface and act as the server. The LANforge FIRE Edge can be the Virtual Station interfaces configured on the WiFi radio. Both interfaces can be on the same machine or multiple LANforge machines can be clustered together for increased traffic generation capacity.

* All system support 802.11 a/b/g/n.
Some systems support 802.11ac as well.

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Quick Start Guide

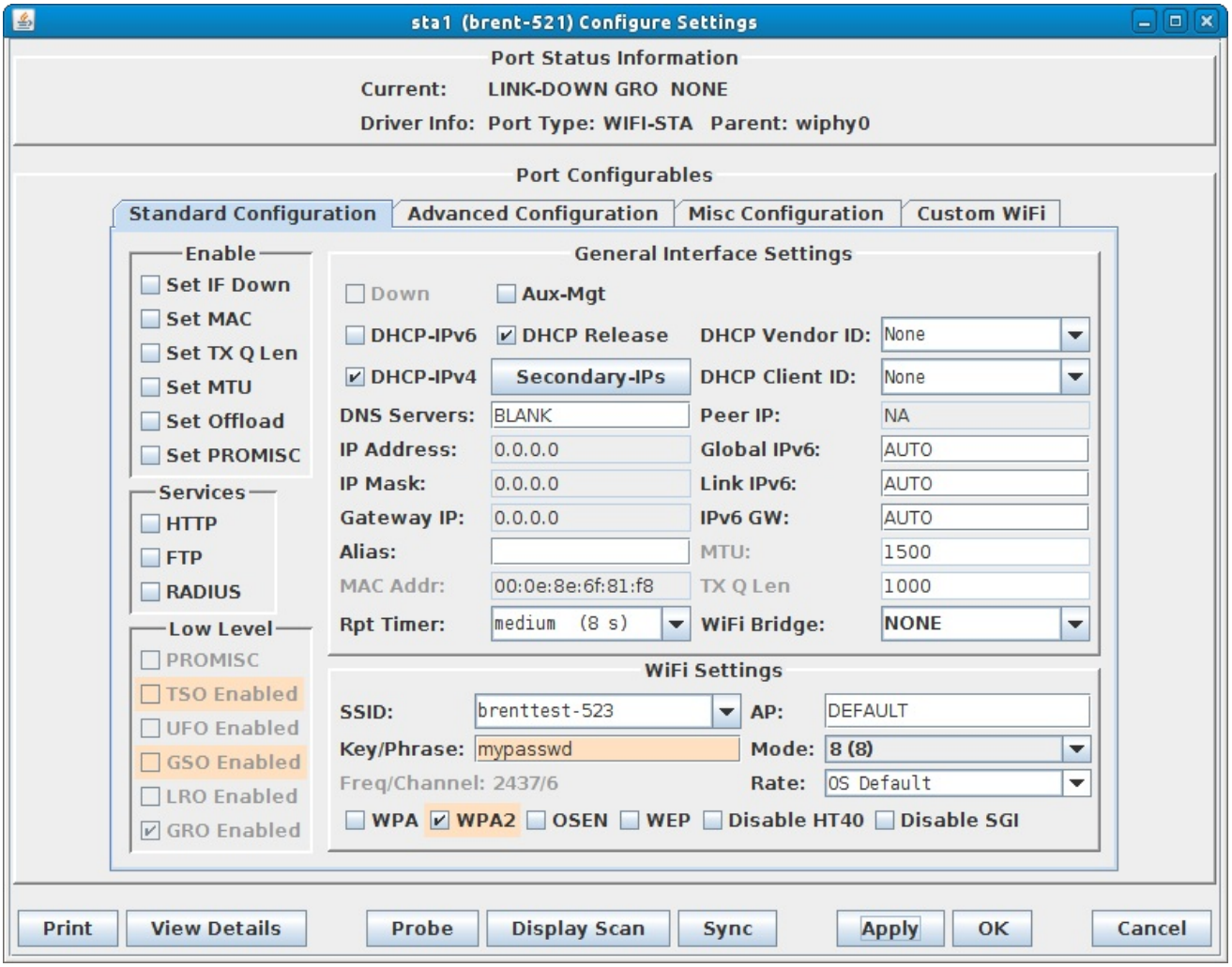
1. Connect Management Ethernet port to Management network or management PC. If connecting directly to a PC, an Ethernet cross-over cable should be used.
2. Connect eth1 wired Ethernet interface to wired Ethernet interface on the AP or network under test. This usually is considered the 'server' side of the network.
3. The Client side of the network will be the Virtual Stations configured on the CT522-128 WiFi NIC(s).
4. Connect power to standard US or European AC power source. If using external battery pack, then connect to that instead.
5. Install the LANforge-GUI on a separate management PC or Laptop. Windows and Linux GUIs are supported: Select the correct one from the CDROM or Candela Technologies Download page and install it. The CT522-128 appliance has a web server that also provides the LANforge GUIs.
6. The CT522-128 should now boot. If DHCP is enabled on the Management network, the CT522-128 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.
7. Start the LANforge-GUI on the management PC and click the 'Discover' button. It should find the CT522-128 appliance and add the IP address to the drop-down box in the Connect widget. Press

'Connect' and you will be connected to the CT522-128.

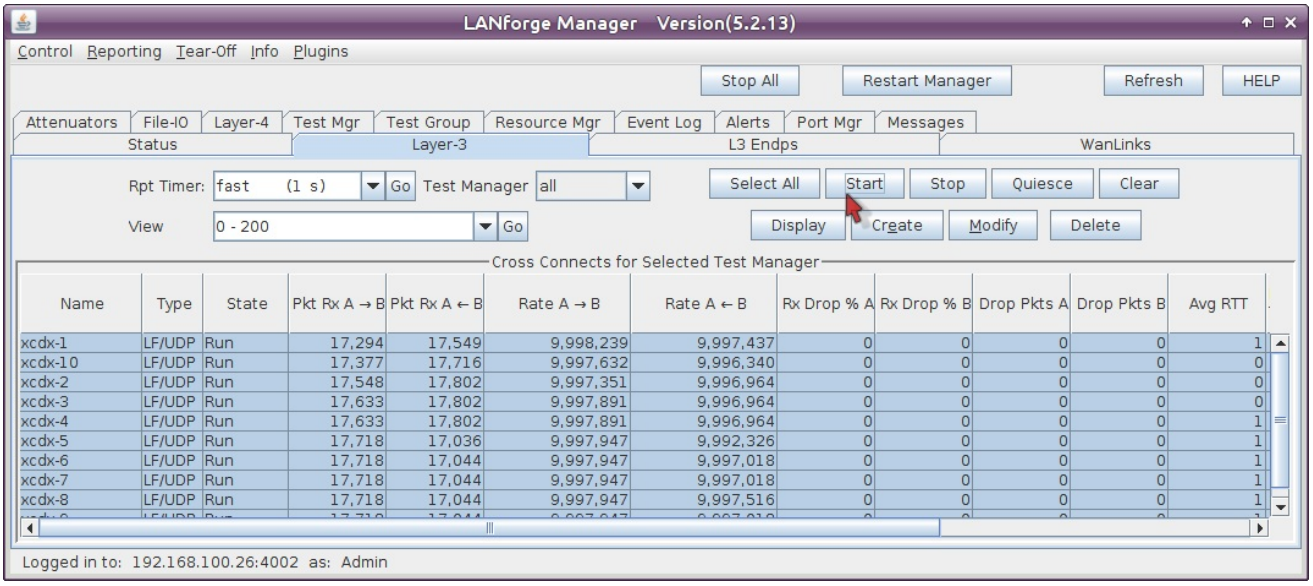
8. Select the Port Mgr tab in the GUI. Double-click on the device called 'wiphy0'. This is the Radio device, and should be configured for the correct, channel, country-code, etc. Next, select one or more of the Virtual Station interfaces and click 'Modify'. Enter the correct IP address information, SSID and WPA/WPA2 password (if Enabled). After applying these changes, the Virtual Station interface should associate with the AP and be ready to send traffic. You may create up to 128 Virtual Station interfaces per CT522-128 with the 'Create' button.
9. Once the interfaces are configured correctly, you can click on the Layer 3, VOIP/RTP and other LANforge-FIRE related GUI tabs and configure/modify/start/stop particular traffic patterns that utilize the virtual stations and wired Ethernet interface. In most cases, you will want one of the FIRE endpoints to be on the wired interface and the other to be on the WiFi Virtual Station interface. It is also valid to generate traffic between two Virtual Station interfaces. The GUI Plugins menu (and right-click on some tables) provides some plugins to do automated testing and reporting. Contact support if you have suggestions for improvements.
10. Any GUI modifications take place immediately after you click 'Submit'.

LANforge WiFIRE Related Images

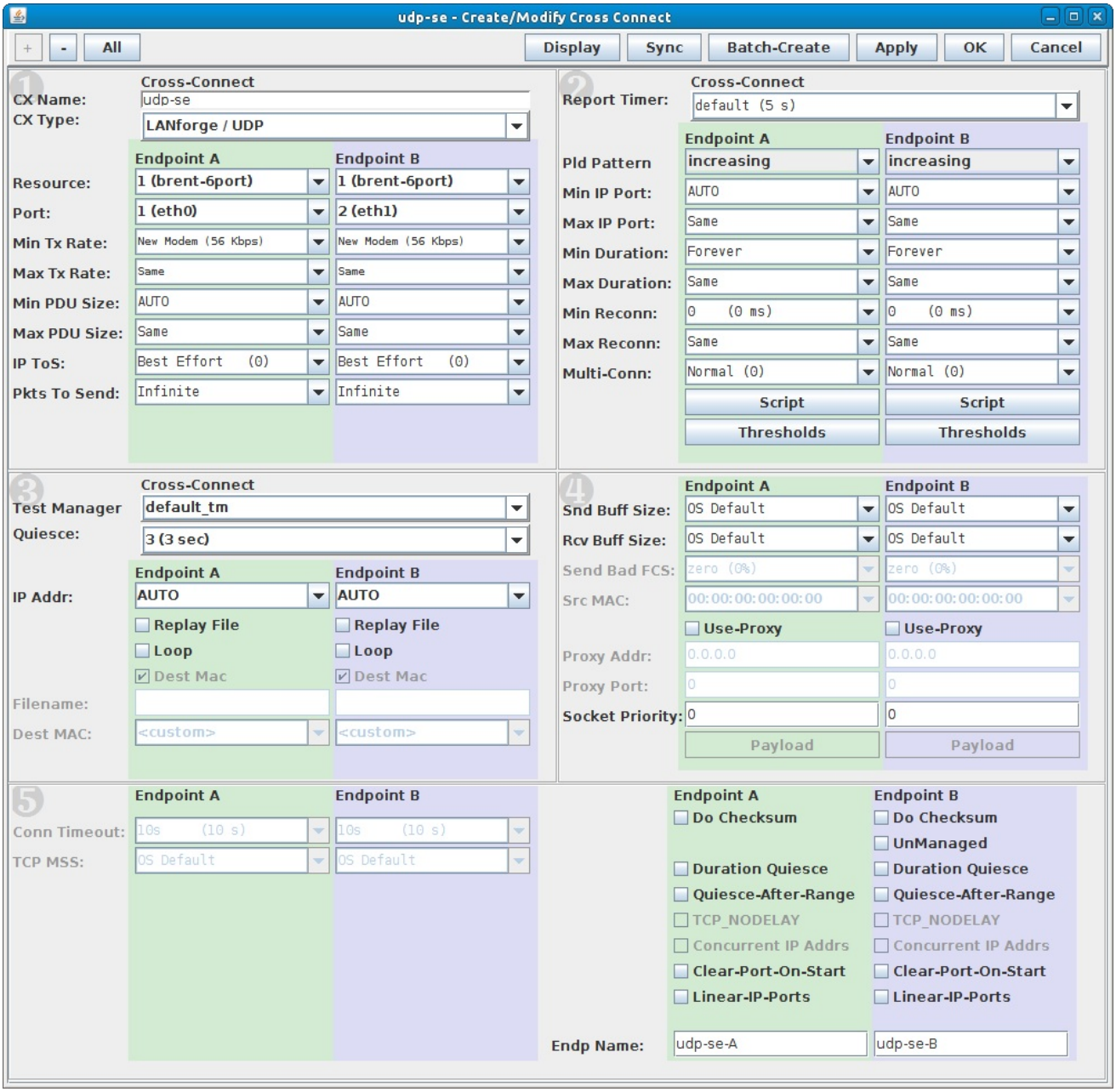
Virtual Station Configuration Screen



Layer 3 (Ethernet, UDP, TCP) Connections



Layer 3 Create/Modify Screen



Software Features

1. Supports real-world protocols:
    1. Layer 2: Raw-Ethernet.
    2. 802.1Q VLANs.
    3. PPPoE: Integrated PPPoE support.
    4. Layer 3: IPv4, IPv6, UDP/IP, IGMP Multicast UDP, TCP/IP.
    5. Layer 4: FTP, HTTP, HTTPS, TFTP, SFTP, SCP
    6. 802.11a/b/g/n Wireless Station (up to 128 per machine).
    7. Layer 4: TELNET, PING, DNS, SMTP, NMAP (via add-on script).
    8. File-IO: NFSv3, NFSv4, CIFS, iSCSI.
2. Supports up to 1000 concurrent TCP connections with base license package.
3. The CT522-128 is able to push up to 330Mbps through an AP, depending on the protocols mix, wireless mode and environment, and speed of the network under test. Supports at least 20 VoIP (SIP, RTP) calls if appropriate licenses are purchased.
4. Supports real-world compliance with ARP protocol.

5. Supports ToS (QoS) settings for TCP/IP and UDP/IP connections.
6. Uses publicly available Linux and Windows network stacks for increased standards compliance.
7. Utilizes libcurl for FTP, HTTP and HTTPS (SSL), TFTP and SCP protocols.
8. Supports file system test endpoints (NFS, CIFS, and iSCSI file systems, too!). File system mounts can use the virtual interface feature for advanced testing of file server applications.
9. Supports custom command-line programs, such as telnet, SMTP, and ping.
10. Comprehensive traffic reports include: Packet Transmit Rate, Packet Receive Rate, Packet Drop %, Transmit Bytes, Receive Bytes, Latency, Jitter, various Ethernet driver level counters, and much more.
11. Supports generation of reports that are ready to be imported into your favorite spread-sheet.
12. Allows packet sniffing and network protocol decoding with the integrated Wireshark protocol sniffer.
13. GUI runs as Java application on Linux, Solaris and Microsoft Operating Systems (among others).
14. GUI can run remotely, even over low-bandwidth links to accommodate the needs of the users.
15. Central management application can manage multiple units, tests, and testers simultaneously.
16. Includes easy built-in scripting for iterating through rates and packet sizes, with automated reporting. Also supports scriptable command line interface (telnet) which can be used to automate test scenarios. Perl libraries and example scripts are provided!
17. Automatic discovery of LANforge data generators simplifies configuration of LANforge test equipment.
18. LANforge traffic generation/management software is supported on Linux, Solaris and MS Windows.

Hardware Specification

1. Samsung Chromebook 550.
2. Operating System: ChrUbuntu with customized Linux kernel.
3. 1 built-in wired Ethernet interface.
4. Atheros chipset based 802.11a/b/g/n 3x3 MIMO Wireless NIC with three internal antennas. Supports up to 128 virtual stations.
5. Intel Dual Core Celeron 867, 1.3 Ghz.
6. 4 GB RAM.
7. 16 GB SSD Hard Drive (about 4GB free)
8. Weight 3.3 lbs, 1.48 kg).
9. Dimensions: 11.5 x 8.5 x 0.83 inches, 292 x 215 x 21 mm

List Price: $10,995 List Price with 1 Year support (17%): $12,864

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
- FIRE Connections: Base FIRE license includes 1000 active connections.
- WiFi RF Attenuator: Adjust WiFi signal strength in a controllable manner.
- RF Noise / Radar Simulator: Simulate RADAR pulses and other RF noise.
- SMA RF Cable Bundle: Used to cable LANforge WiFIRE radios to device-under-test.
- LANforge-ICE Network Emulation.
- VOIP: Each concurrent call over the included package requires a license.
- Armageddon: Each pair of ports requires a license if not already included.
- External battery pack: 12+ hours for CT521, CT523, CT919, CT92X platforms. Ask for others.

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