

## **CT521bX Economy LANforge WiFIRE 802.11a/b/g/n/AC/AX/6E 2 radio WiFi Traffic Generator Supporting 3 AP Interfaces**

The CT521bX wireless traffic generator is an excellent choice for testing Station devices and other WiFi networks. The 2x2 MTK7916 /AX (a/b/g/n/ac/AX/6E) chipset NICs can support 19 virtual stations on each of two bands, for 38 per radio. This system is licensed for 3 AP interfaces total. The AP interfaces can be in Bridge or Router mode, and are independently configurable to support different protocols and testing scenarios. The system can act as DHCP, HTTP/FTP and other servers for testing in an isolated environment. It can also route traffic to the Internet if desired. The system provides many statistics in its management GUI as well as through JSON and other automated means.

**There are two MTK7916 /a/b/g/n/AC/AX 2.4/5Ghz/6E dual-concurrent WiFi radios per CT521bX and multiple LANforge systems can be clustered together for even more realistic radio interference patterns and increased capacities.**

All virtual APs on the same radio 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 APs can be /b, /g, /n, or /ax. If the radio is on a 5Ghz channel, the stations can be /a, /n, ac, or ax. The CT521bX has no fans and is silent. It has 2 antenna. It will fit into a small travel bag or briefcase for easy portability. The system should be managed with the LANforge-GUI software installed on a laptop or PC, or over vnc or remote-desktop. The CT521bX can also be managed over a serial console in text mode. Maximum throughput for the CT521bX is about 1Gbps and is bound by the relatively weak CPU. For faster systems, consider the CT522, CT523c, and CT525 chassis.

Performance reports:

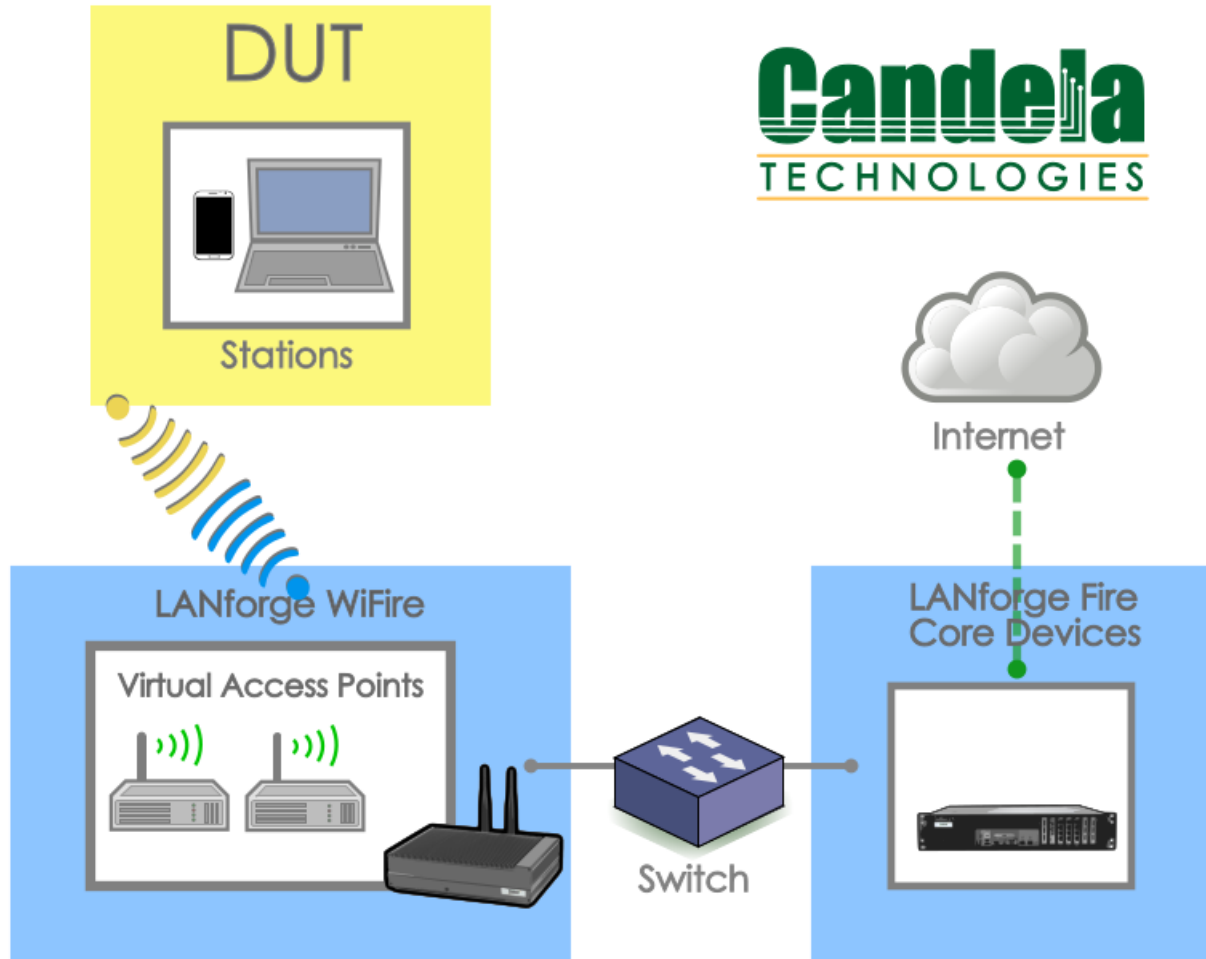
TBD



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



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### Quick Start Guide

1. Connect Management Ethernet port to Management network or management PC.
2. Connect a different wired Ethernet interface to an upstream data network if you wish the LANforge AP to provide Internet connectivity.
3. The Station DUT will connect to the LANforge over WiFi and use it as an AP.
4. Connect power to standard US or European AC power source. If using external battery pack, then connect to that instead. Click button to power on the unit.

5. The CT521bX should now boot. If DHCP is enabled on the Management network, the CT521bX will automatically acquire an IP address. If DHCP is not available, the IP address will be set to **192.168.1.101**.
6. Install the LANforge-GUI on a separate management PC or Laptop, or use VNC or remote-desktop programs to access the LANforge system directly. Windows, MAC-OS and Linux GUIs are supported: Select the correct one from the web page served from the LANforge system and install it.
7. Start the LANforge-GUI on the management PC and click the 'Discover' button. It should find the CT521bX appliance and add the IP address to the drop-down box in the Connect widget. Press 'Connect' and you will be connected to the CT521bX.
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 AP interfaces and click 'Modify'. Enter the desired SSID and WPA/WPA2 password (if Enabled). See this page for more information on configuring LANforge APs: [lfgui\\_wifire\\_cookbook.php](#)
9. Any GUI modifications take place immediately after you click 'Submit' or 'OK'.

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## LANforge WiFIRE AP Related Images

### Virtual AP Configuration Screen

The screenshot shows the 'vap2100 (lf0350-88f0) Configure Settings' window. At the top, it displays 'Port Status Information' with 'Current: LINK-UP GRO NONE' and 'Driver Info: Port Type: WIFI-AP Parent: wiphy1'. Below this is the 'Port Configurables' section with four tabs: 'Standard Configuration', 'Advanced Configuration', 'Misc Configuration', and 'Custom WiFi'. The 'Standard Configuration' tab is active, showing a list of checkboxes on the left (Set IF Down, Set MAC, Set TX Q Len, Set MTU, Set Offload, Set PROMISC) and a 'Services' section (HTTP, FTP). The main area is divided into 'General Interface Settings' and 'WiFi Settings'. 'General Interface Settings' includes options for 'Down', 'Aux-Mgt', 'DHCP-IPv6', 'DHCP-IPv4' (selected), 'DHCP Release', 'DHCP Vendor ID', 'DHCP Client ID', 'DNS Servers', 'IP Address', 'IP Mask', 'Gateway IP', 'Alias', 'MAC Addr', 'Rpt Timer', 'Secondary-IPs', 'Peer IP', 'Global IPv6', 'Link IPv6', 'IPv6 GW', 'MTU', 'TX Q Len', and 'WiFi Bridge'. 'WiFi Settings' includes 'SSID' (jedway2-wpa2-2100), 'Key/Phrase' (jedway2-wpa2-2100), 'AP' (DEFAULT), 'Mode' (802.11abgn-AC), 'Freq/Channel' (5805/161), 'Rate' (OS Default), 'DTIM-Period' (2), 'Max-STA' (2007), 'Beacon' (240), 'WPA', 'WPA2' (checked), 'WEP', 'Verbose Debug', 'Disable HT40', 'Disable HT80' (checked), 'Enable VHT160', and 'Disable SGI'. At the bottom, there are buttons for 'Print', 'Display', 'Logs', 'Probe', 'Display Scan', 'Sync', 'Apply', 'OK', and 'Cancel'.

## iPerf Connection

Create/Modify Generic Endpoint

Name: cv\_iperf-1.eth1

Rpt Timer: fast (1 s)

Test Manager: default\_tm

Shelf: 1

Resource: 1 (ct523c-20e9)

Port: 1 (eth1)

Endp ID: 6

Command Builders

iperf3

☐ Server

☒ Client

☐ UDP

☒ TCP

☒ Transmit

☐ Receive

Run Time: 60

Target: 172.16.1.99

Pkts To Send: Infinite

Write-Size: AUTO

Tx Rate: 1000 (1 Kbps)

IP ToS: Best Effort (0)

Additional options:

Command: iperf3 --forceflush --format k --precision 4 -c 172.16.1.99 -t 60 --tos 0 -b 1K --bind\_dev eth1 -i 1 --pidfile /tmp/lf\_helper\_iperf3

Command Output

Result

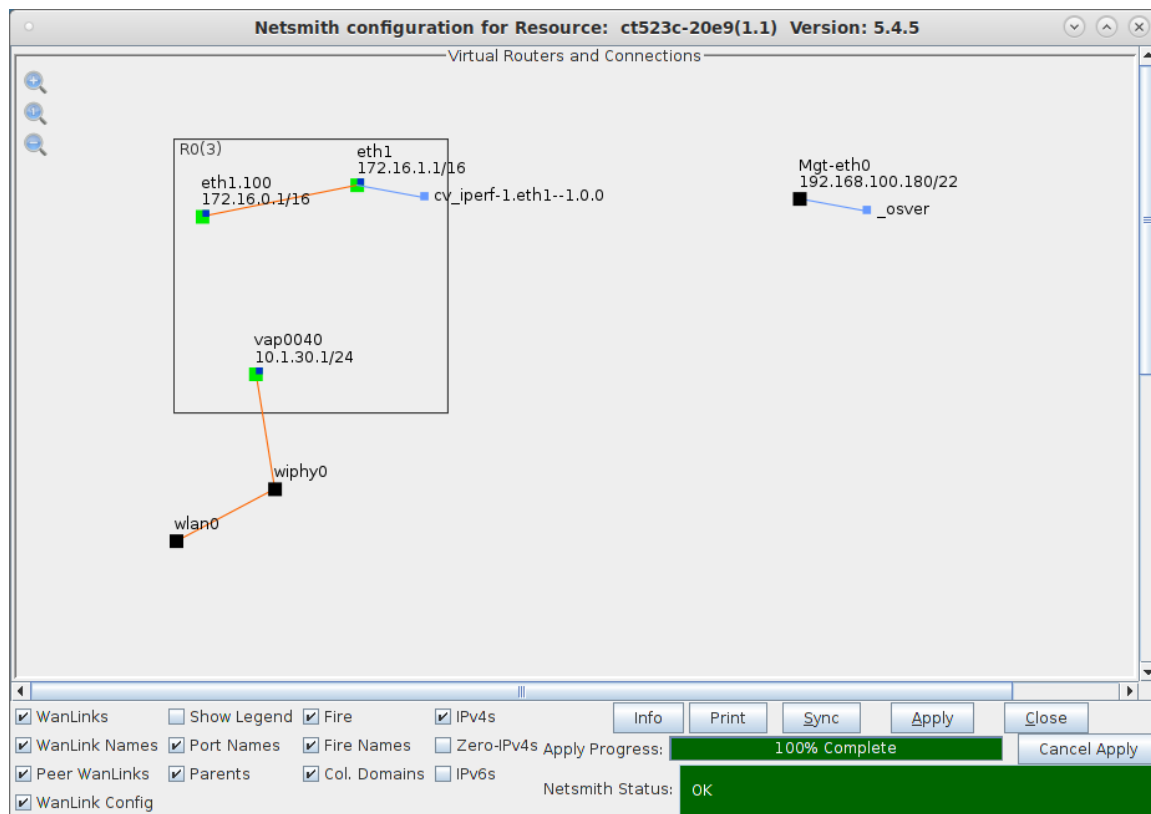
Sync

Apply

OK

Cancel

## Virtual Router Example



## 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 4-7: FTP, HTTP, HTTPS, TFTP, SFTP, SCP
  6. 802.11a/b/g/n/AX Wireless AP (up to 3 per machine).
  7. Layer 4-7: 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 CT521bX is able to support about 1Gbps WiFi throughput, depending on the protocols mix, wireless mode and environment, and speed of the device under test. This system is CPU limited, but the affordable price makes it easier to afford multiple units to spread around the network-under-test for greater combined throughput. Consider the CT522, CT523c, and CT525 for more powerful systems. (**Performance results: TBD**)
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, MAC 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 and MS Windows.

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## Hardware Specification

1. Affordable Appliance with no fans.
2. Operating System: Fedora Linux with customized 64-bit Linux kernel.
3. Three 1Gbps Ethernet ports, room for two wifi NICs
4. Mediatek 802.11a/b/g/n/AC/AX/6E 2x2 MIMO dual-concurrent radio with three external antenna each. Radio vendor information: **MT7916 AW7915-NPD** Supports up to 19 virtual stations on each of two bands. Licensed for 3 AP interfaces total.
5. Antenna-to-Radio association: See labels on chassis.
6. Intel Atom E3845 quad-core 1.9Ghz processor.
7. RJ45 Serial console (115200 8 N 1) for console management & initial configuration.
8. 4 GB RAM.
9. 60+ GB Solid State mSata storage Drive.
10. Larger storage drives available.
11. 12v 2AMP external power supply (brick).
12. Weight: 2 lbs
13. Dimensions: 8 x 8 x 2 inches    Metric: 200 x 200 x 60 mm.
14. Operating Temperature: -20 ~ 45°C.
15. Certification: CE Emission, FCC Class A, RoHS

List Price: \$call    List Price with 1 Year support (17%): \$call

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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
- FIRE Connections: Base FIRE license includes 1000 active connections.
- LANforge-ICE Network Emulation.
- 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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Last modified: Mon Feb 3 05:56:21 PM PST 2025