



Network Testing and Emulation Solutions

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WISER-50 Mobile Wireless Network Emulator

The WISER-50 is a unique package of tools to emulate mobile networks in real-time. WISER is the result of a partnership between Telcordia and Candela Technologies. Candela provides the core LANforge emulation framework while Telcordia provides the mobility, radio waveform emulation and scenario creation tools. The end result is an integrated package that currently emulates up to 50 mobile nodes. The nodes may be connected by emulated ground-to-ground TDMA radio links or ground-to-satellite TDMA links. OSPF virtual routers run on each emulated node to provide dynamic route propagation and discovery.

The WISER-50 includes a 24 port switch that allows users to inject traffic for a maximum of 24 nodes concurrently. QoS settings and emulated back-pressure from the wireless links allows realistic experimentation with applications that take advantage of ToS/QoS fields in the IP protocol.

The WISER-50 chassis is configured with 16GB RAM, 1 quad-core E3 3.5Ghz processor and a 200+GB hard drive. The system runs a slightly modified version of 64-bit Fedora Linux and supports standard VGA, keyboard and mouse interfaces for easy console/desktop access. The WISER-50 is relatively noisy, so it is better for a data center deployment than a desktop environment. Other hardware form factors are available.

An additional Windows PC is required for scenario creation and the optional TIREM (Terrain Integration Rough Earth Model) package. This PC is **not** included by default: Talk to your sales representative if you wish this supplied as part of the package.

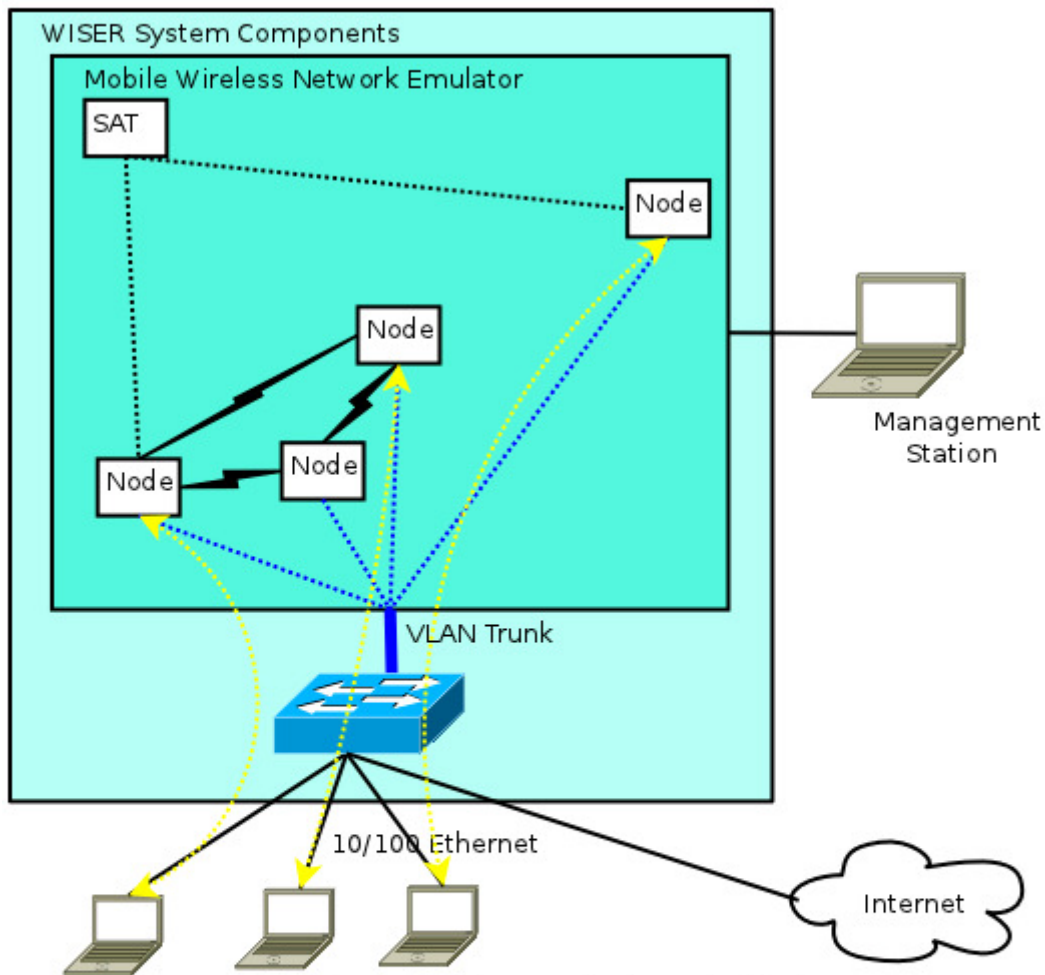


NOTE: This product may have a different hardware configuration than the system pictured above.
Refer to your official quote for details.

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Example Network Diagram

WISER Mobile Wireless Network Emulator



End-user applications logically connected to each Node in the emulated network. Each physical port on the switch is connected directly to an individual node through use of 802.1Q VLANs.



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Quick Start Guide

1. Connect Management ethernet port on the WISER machine to Management network or Management PC. If connecting directly to a PC, an ethernet cross-over cable might be necessary. Alternatively, connect a VGA monitor, a keyboard and a mouse to the chassis and manage it locally.
2. Connect 802.1Q VLAN switch's trunk port to eth2 of the WISER machine. This is the VLAN trunk between the WISER machine and the VLAN switch.
3. Connect Clients to the ports on the 802.1Q VLAN switch. Each port on the switch is configured to bridge regular un-tagged ethernet frames to one of the VLANs on the trunk port leading to the WISER machine: Port 1 is connected to Node 1, etc.
4. Connect power to the units and turn them on. The order in which they are booted does not matter.
5. Install WISER GUI and scenario creation packages on a separate Windows machine. The LANforge GUI may be installed as well, but is not required to use WISER.
6. The WISER-50 should now boot. If DHCP is enabled on the Management network, the WISER-50 machine 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 start scripts.
7. Start the WISER GUI on the management PC and connect to the WISER system's management IP.

WISER Related Screen Shots

Scenario Creator

WISER Emulation Tool
File Mode Scenario editing

Satellite (node #0):
Name: Ka_Band_1
Type: KA-SATCOM

Mobility

Reset
Pause time flow
Normal time flow
Time flow x5
Time Flow x10

emulation time
00:00:00.000
End test scenario

Zoom

Pointer coordinates (lon, lat): -109.626, 38.714

Display

Link color: None Schedule Demand Bit error ratio Bandwidth Load
0kbps 56000kbps

Hide satellite links Hide zero demand links Show mobility lines
 Show only net group: All Show traffic flow lines

Node/Link Info

Mode: scenario editing | Scenario file name: C:\Documents and Settings\Michael Kaplan\Desktop\scenarios\stephanie\nodedensity\nodedensity_scenario.xml

WISER Dense Mesh Scenario

WISER Emulation Tool

File Mode Scenario editing

Satellite (node #0):
Name: Ka_Band_1
Type: KA-SATCOM

Mobility

Reset
Pause time flow
Normal time flow
Time flow x5
Time Flow x10

emulation time
00:00:00.000
End test scenario

Zoom

Display

Link color: None Schedule Demand Bit error ratio Bandwidth Load
0.0 0.0

Hide satellite links Hide zero demand links Show mobility lines
 Show traffic flow lines

Show only net group: All

Pointer coordinates (lon, lat): 119.424, 38.723

Node.Link Info

Mode: scenario editing | Scenario file name: C:\Documents and Settings\Michael Kaplan\Desktop\scenarios\stephanie\trafficcongestion\trafficcongestion_scenario.xml

WISER Multiple Group Emulation

WISER Emulation Tool
File Mode Scenario editing

Satellite (node #0):
Name: Ka_Band_1
Type: KA-SATCOM

Mobility

- Reset
- Pause time flow
- Normal time flow
- Time flow x5
- Time Flow x10

emulation time
00:00:00.000

End test scenario

Zoom

Display

Link color: None Schedule Demand Bit error ratio Bandwidth Load

Hide satellite links Hide zero demand links Show mobility lines

Show only net group: All Show traffic flow lines

Node.Link Info

Mode: scenario editing | Scenario file name: C:\Documents and Settings\Michael Kaplan\My Documents\scenarios\qos\qos_scenario.xml

Emergy Wayne
Pointer coordinates (Apr, lat, lon): 49.702, 98.867

Software Features

Scenario Definition Tool/Visualization

- Complete Scenario Definition to add nodes, create mobility vectors and traffic profiles for run-time executable emulation.
- Runtime GUI visualization with mobility and different link and traffic conditions.
- Automatic Traffic generation & execution through the GUI.
- Drag-and-drop capability for re-positioning of nodes.
- Scenario consistency checks (against node capabilities and physical limitations such as speed of vehicle).
- Mock-up run of the defined scenario (i.e., run that does not involve the emulator core to look at the scenario)
- Manipulation of groups of nodes (positioning, movement as a group)
- Capture and replay log files via GUI.
- Support for 5/6 pre-defined scenarios.

RF Module

- Support for TIREM, exponent-based, shadowing, fading, rain models (**not** included in base package.)
- Support for adaptive modulation/coding for BER targets for ground-ground links.
- Support for ground-to-ground & satellite waveforms

- Support for MA TDMA (variants for ground-ground, ground-air & satellite links).
- Support for minimal CSMA/CA functionality.
- Support to add effects of selective ARQ & re-transmissions for the TDMA MAC.

Routing Module

- Support for IPv4 OSPF & PIM (multicast)
- Support for IP Fast-route.

QoS Module

- Supports DiffServ (WFQ, WRED in tc).
- Support for back-pressure from radio to router for flow control & dynamic change of interface rate.
- Support for QoS based MAC scheduling.

Reporting Capability

- Reports on traffic carried, jitter, delay, etc.

Hardware Specification

WISER Server Specifications

- High-End Intel Multi-Core 1U rackmount server.
- Operating System: Fedora 64-bit Linux with customized Linux kernel.
- 4 built-in 10/100/1000 Ethernet interfaces, one of which should be used for management.
- High-availability Ethernet hardware bypass option available.
- One Quad-Core Intel E3 processor, 3+Ghz
- 1 PCIe x16 slot (2-6 port 10/100/1000, 1-2 port 10G fibre, etc)
- 8 GB or more RAM.
- 40 GB or larger Hard Drive.
- Solid State Drive option available.
- Slim CDROM drive.
- Standard US or European power supply (automatically detects EU v/s US power).
- Weight: 18 lbs or 8.2 kg.
- Dimensions: 17 x 14 x 1.75 inches (14-inch deep 1U rackmount server) Metric: 432 x 356 x 44 mm.
- Power Supply: Fixed 350W AC
- Estimated Power Usage: 1.4 Amps @ 120VAC under load, 0.7 Amps idle.
- ROHS compliant.

Ethernet Switch Specifications

- 24-port 802.1Q VLAN switch with 2 GigE uplinks.
- 24 10/100 autonegotiating RJ45 Ethernet interfaces.
- 2 10/100/1000 autonegotiating RJ45 Ethernet interfaces.
- Dimensions: 17 x 8 x 1.7 inches (Standard 8-inch deep 1U rackmount) Metric: 432 x 203 x 43 mm.

Feature Upgrades

Unless otherwise noted, 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 requires a license.
- Armageddon: Each pair of ports requires a license.

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