octoBox Stackable Wireless Testbed

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octoBox™ Stackable

- **Modern design optimized for wireless test applications**
- **Affordable small anechoic chamber**
  - Stable and repeatable over-the-air coupling to DUT antenna(s)
- **700 MHz to 6 GHz**
- **Complete isolation – measure RX down to -100 dBm without screen room**
- **Optimized for ergonomic interconnections among multiple boxes and multiple stacks**

Wireless Test Applications

- **Test applications include**
  - Certification
  - Emissions
  - Radio range
  - Performance in the presence of noise or interference
  - Multi-radio networks behavior
  - Roaming
  - DSRC (connected car test)

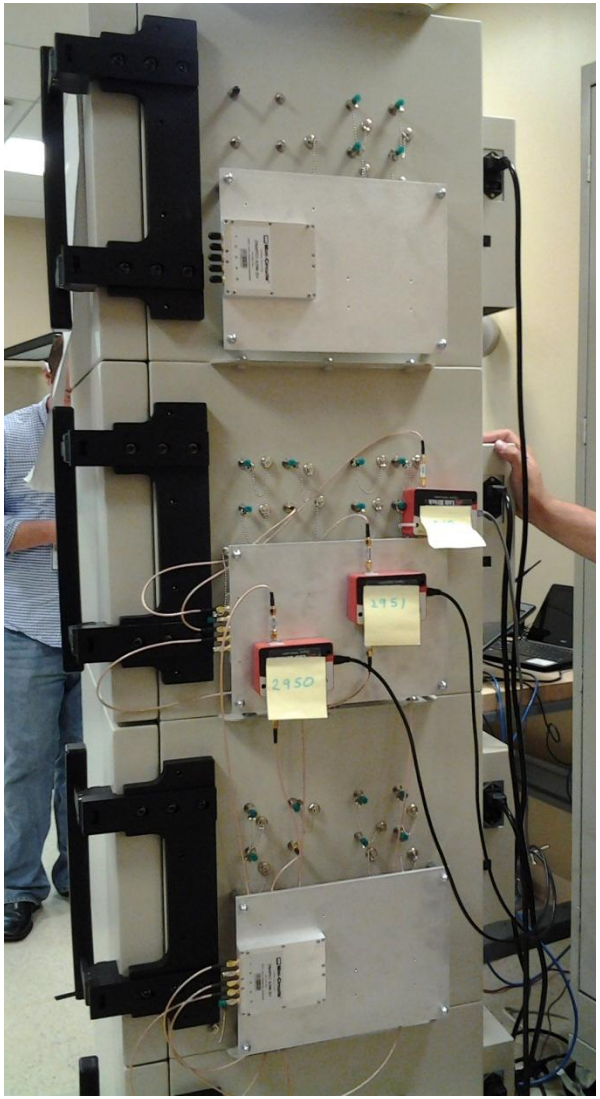
DSRC = direct short range communications

octoBox – Ease of Testbed Setup

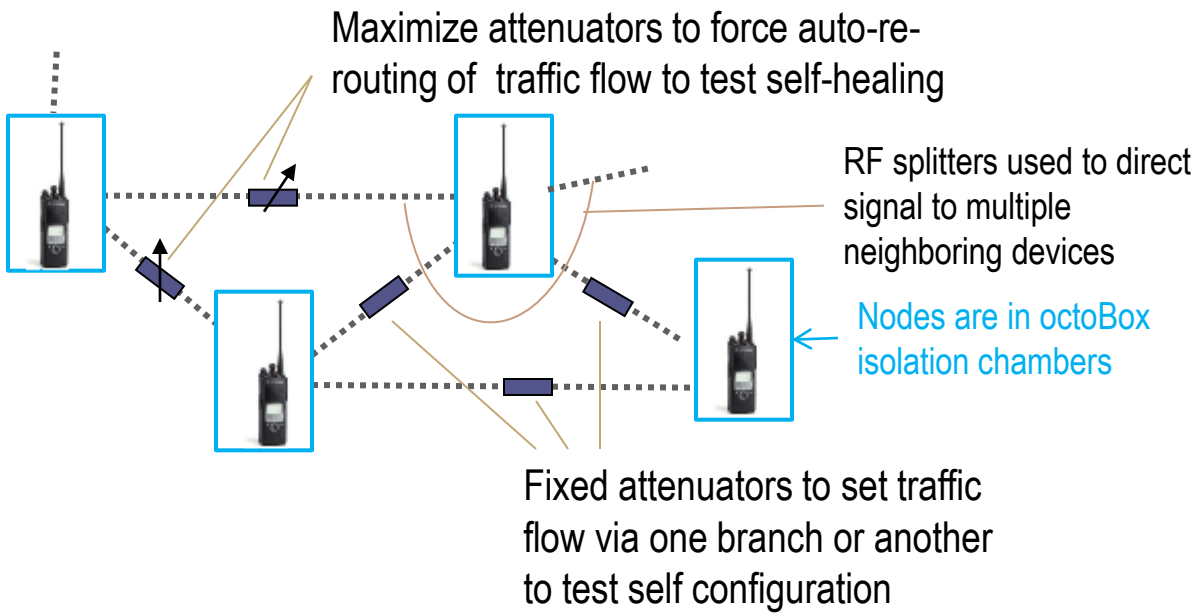
- **High frequency RF testbeds often suffer from interference coupling into poorly isolated RF enclosures and via disorderly cabling. This can cost engineers months of frustration while chasing noise and interference, rather than getting products to market.**
- **octoBox Stackable is carefully designed for neat and robust RF interconnections with filtered control lines.**
- **Control and data communications is supported via feed-through filters**
  - PoE, gig Ethernet
  - USB 2.0
  - Serial
- **Up to 4 filtered control/data connections of user-selectable type are supported.**

Mirror image Stackable models are available for convenient multi-stack testbed interconnections.

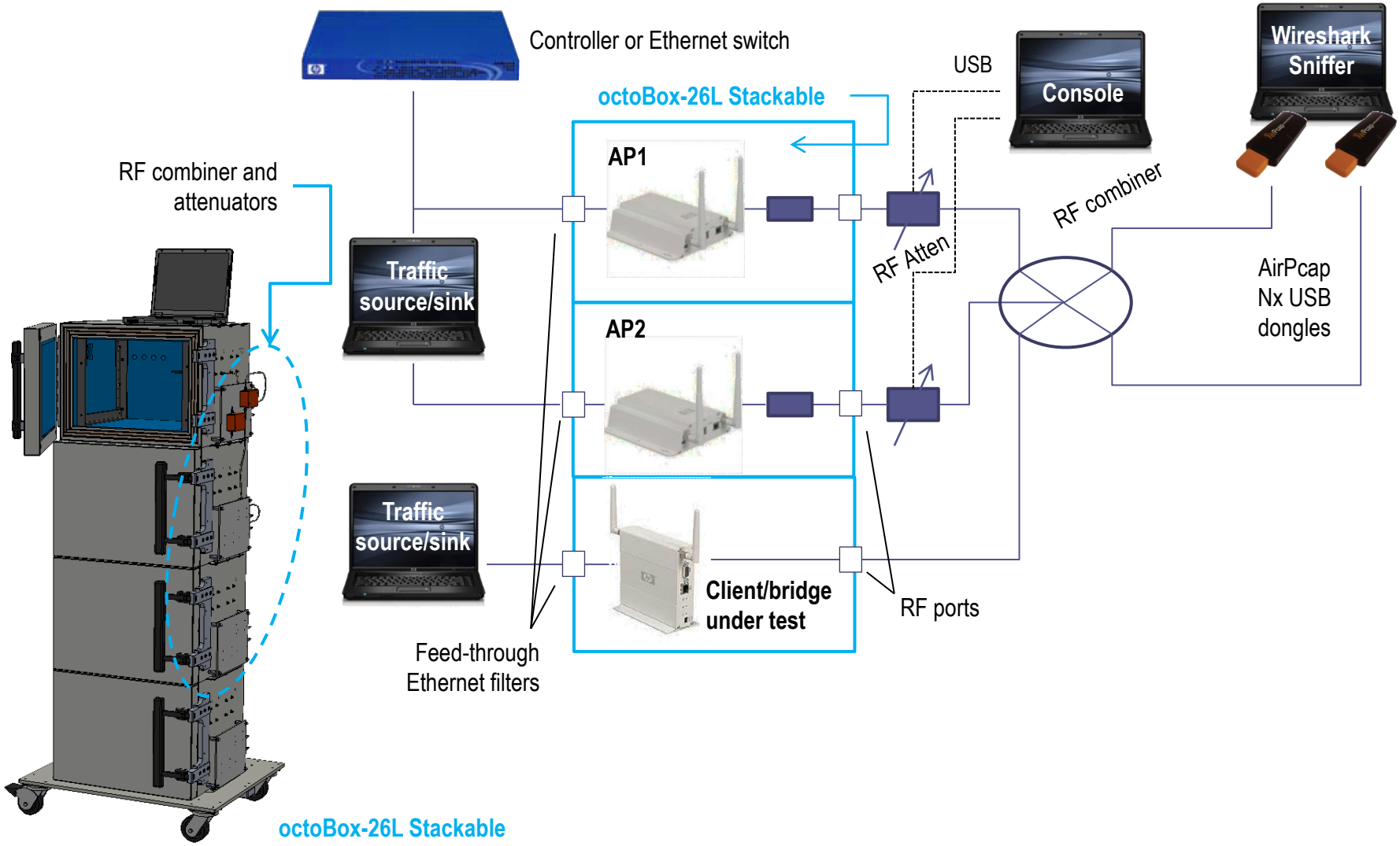
Wireless Mesh Test Configuration



octoBox quadStack isolation enclosures with built-in RF combiners and attenuators



octoBox Roaming Test Configuration



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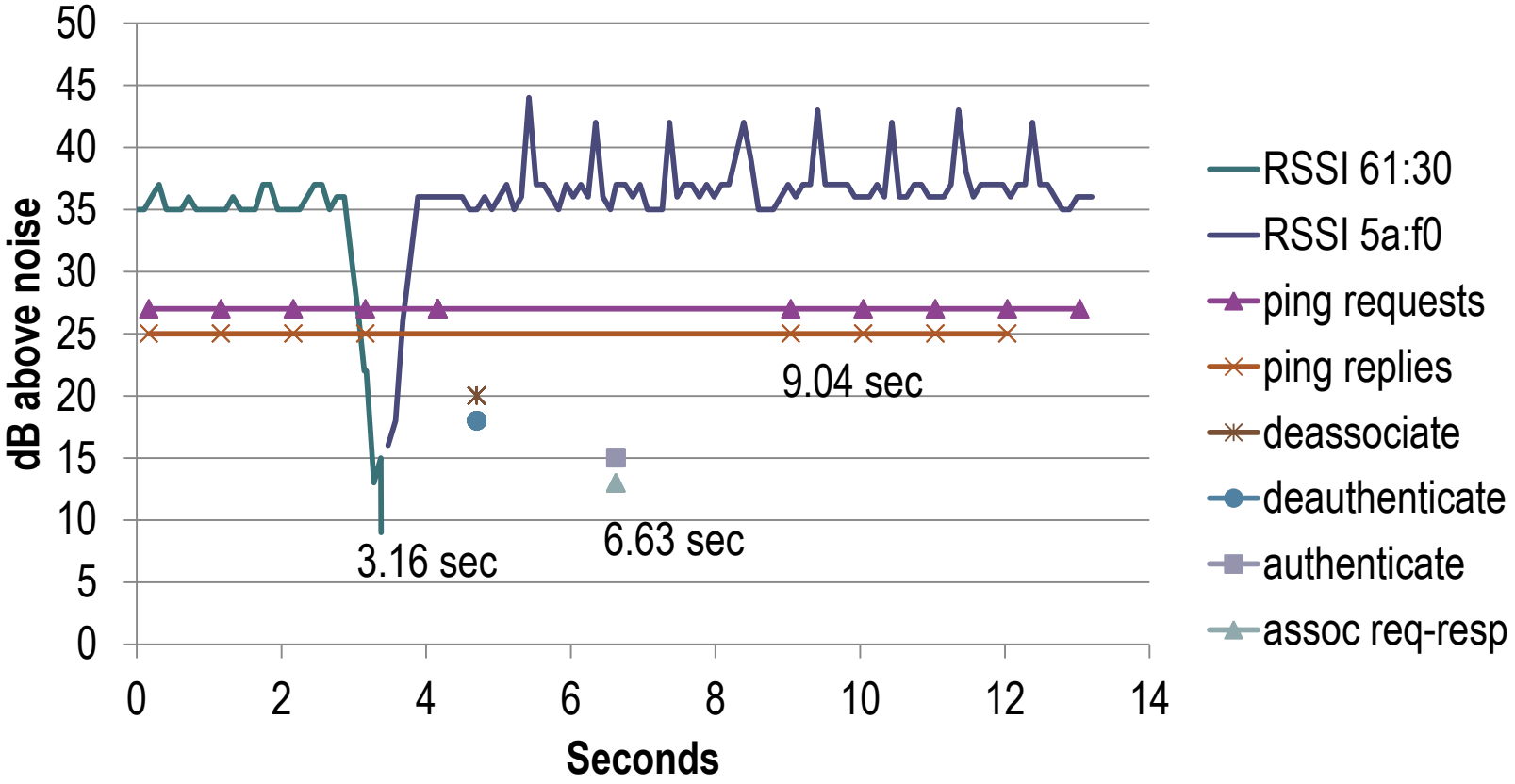
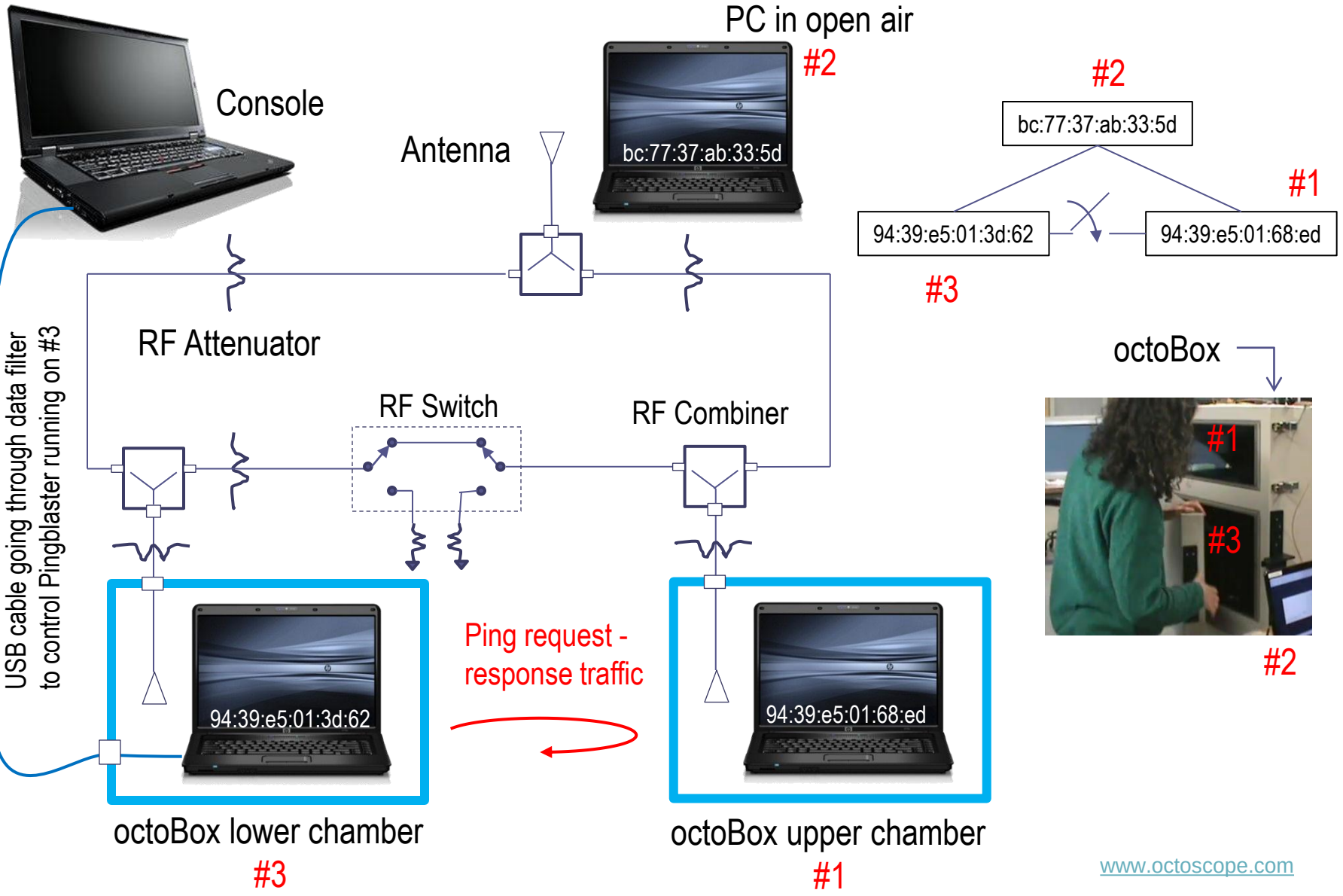
Roaming Test Results - Example



Last ping response: 3.16 sec
Association: 6.63 sec
First ping response: 9.04 sec

Mesh Testbed Prototype



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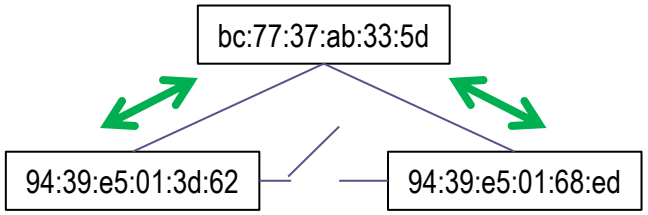
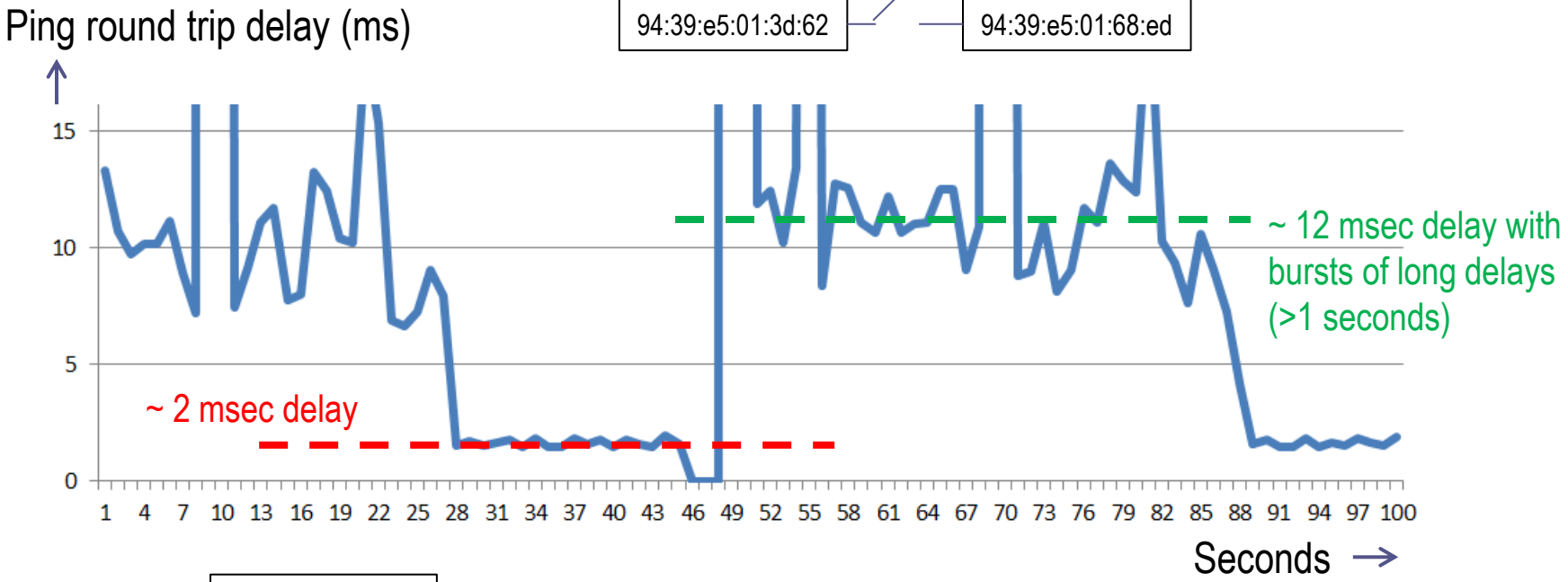
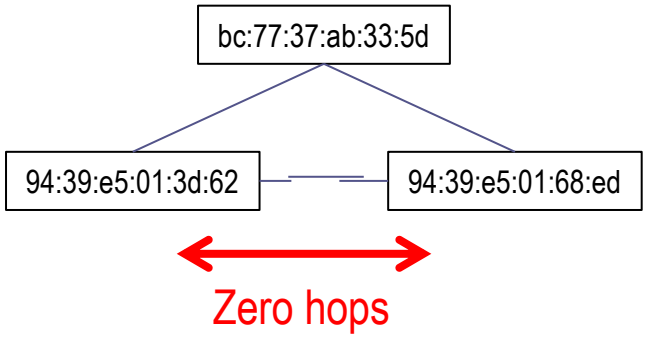
Delay Through Mesh One hop



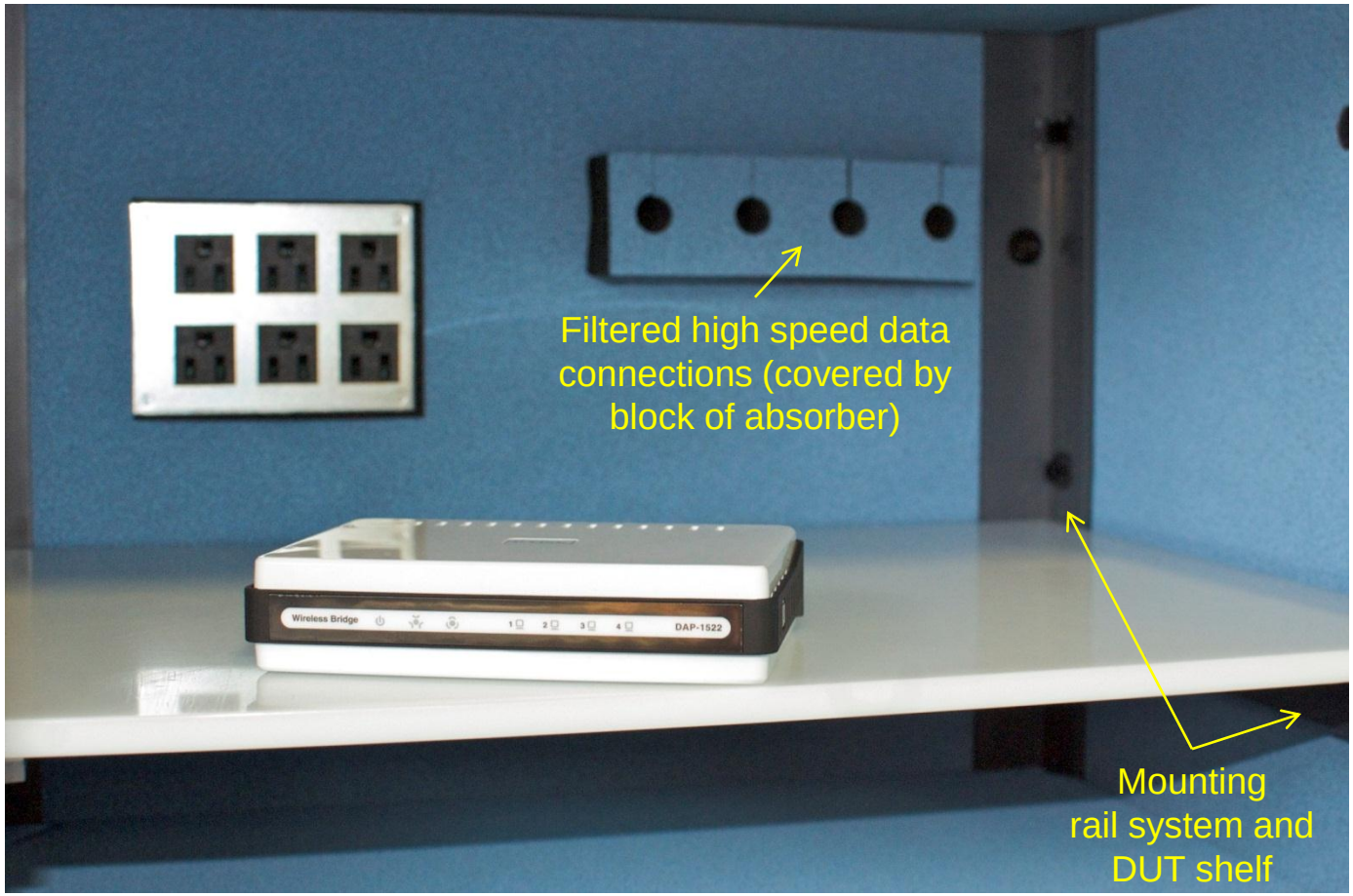




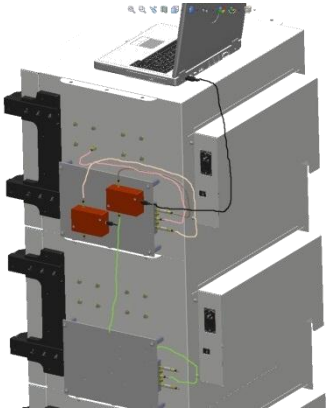
Pingblaster application	BATMAN control app
BATMAN 2011.3.0 driver	
Linux kernel 2.6.38	
Linux Mint distribution v11	

BATMAN = better approach to mobile ad hoc networking

Internal View – octoBox-26R



Features



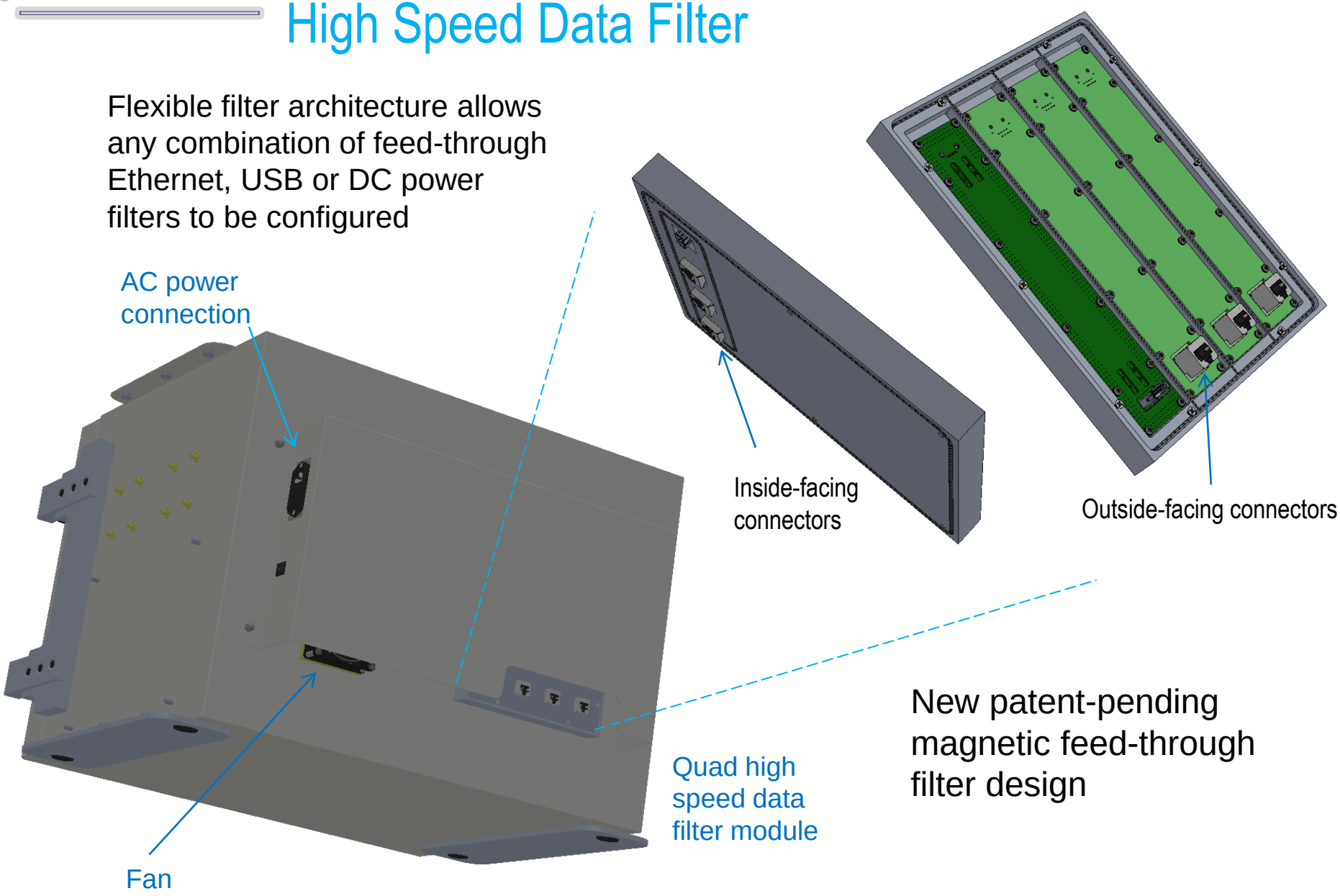
Bulkhead
SMA RF ports

Studs provided on each box for mounting an optional RF combiner-attenuator module

Protective shroud

High Speed Data Filter

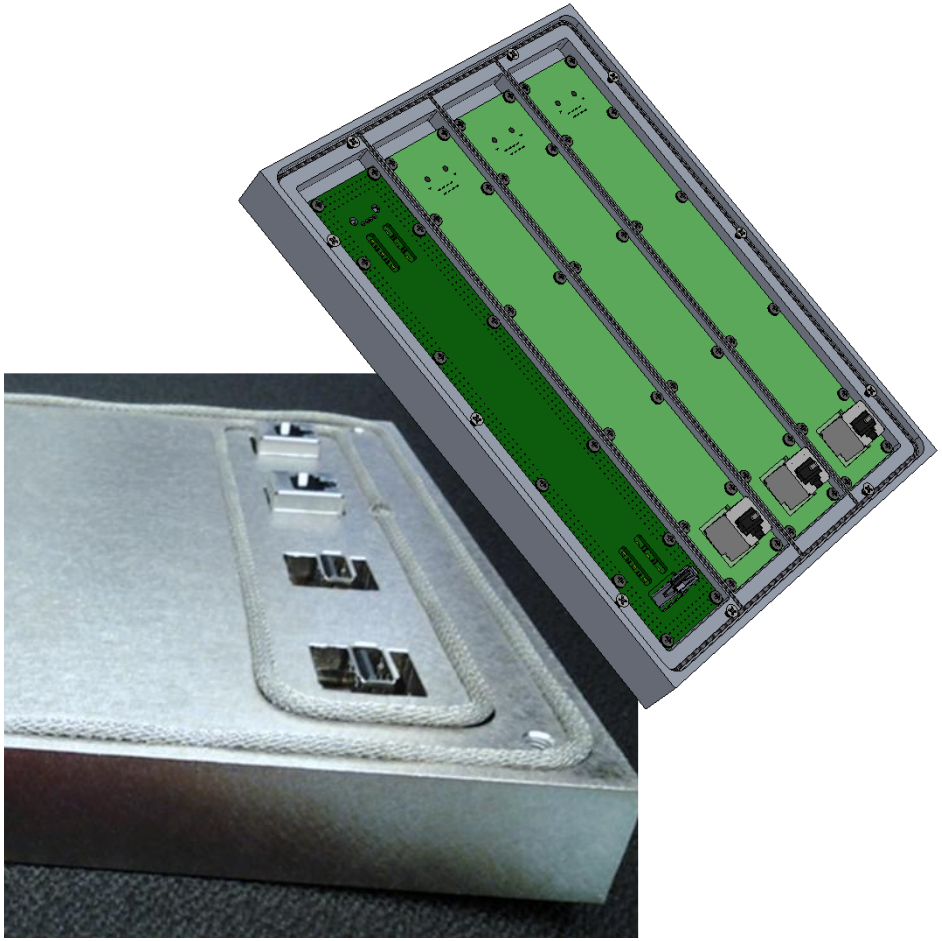
Flexible filter architecture allows any combination of feed-through Ethernet, USB or DC power filters to be configured



New patent-pending magnetic feed-through filter design

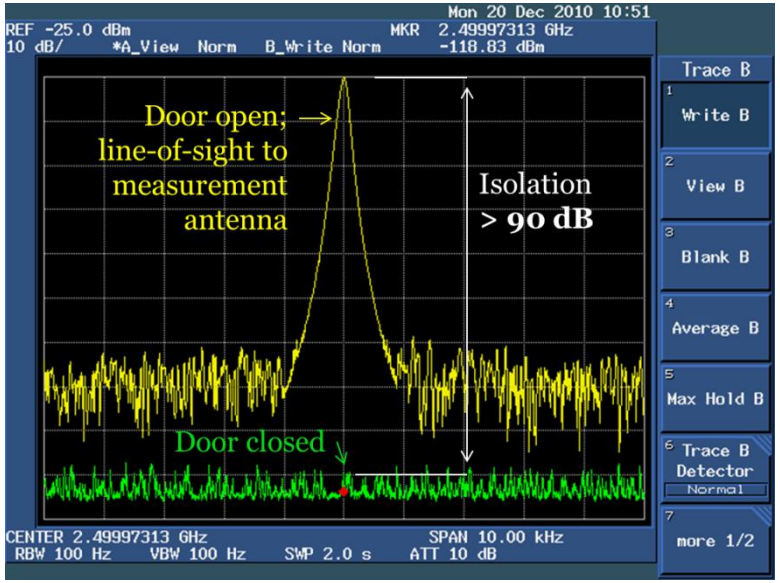
Isolation and Filtering

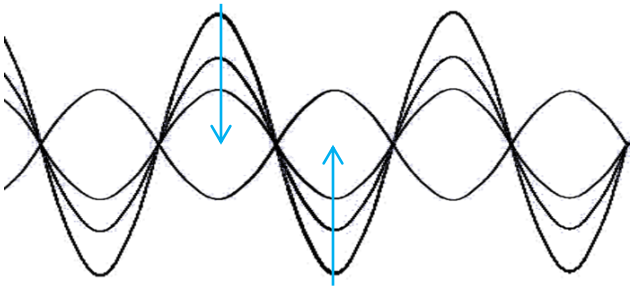
- **Creating controlled RF conditions with good isolation is challenging, particularly for large-scale RF test setups, such as mesh configurations.**
  - Short wavelength high frequency signals couple via many paths, including copper cabling, poor/aging gasketing, ground loops, etc. Sources of interference may be difficult to locate in a multi-box setup.
- **Isolation considerations**
  - Isolation should be measured and specified with a fully cabled test setup.
  - All copper cabling, including Ethernet and power cabling, will act as antennas contributing to RF coupling among enclosures and thus limiting attenuation range setting.
  - Upfront investment into high grade enclosures with good data and power feed-through filtering and absorptive foam can save 1-2 months of chasing uncontrolled paths of interference in the test setup.



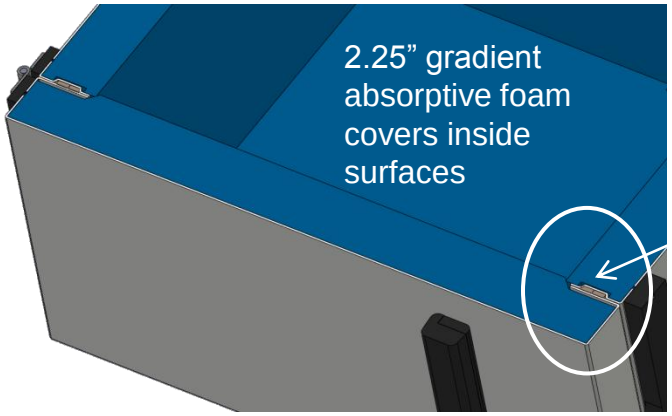
Isolation and Absorption

- **Superior isolation and absorption support over the air coupling and ensure robust operating margin for conducted coupling of RF signal**
- **Isolation**
  - Allows accurate path loss setting
  - Prevents errors caused by ambient noise and crosstalk
- **Absorption**
  - >20 dB achieved using gradient absorptive foam
  - Eliminates standing waves that cause nulls in the signal
  - Improves overall isolation of the enclosure





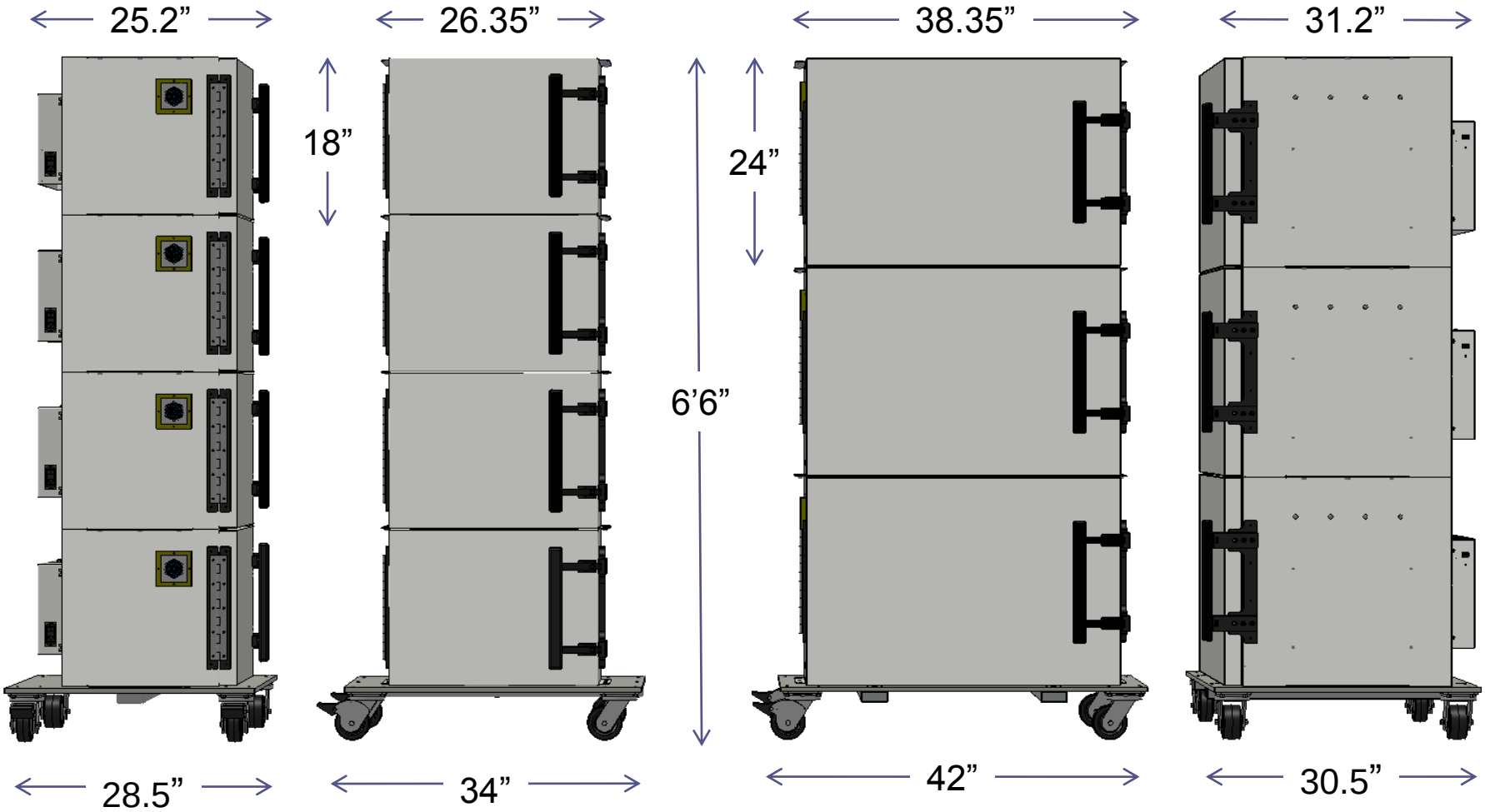
Standing waves create fluctuations in the signal



Dual gasketing and right angle door seals

Gradient absorber matches impedance of metal to air

octoBox quadStack and triStack Dimensions

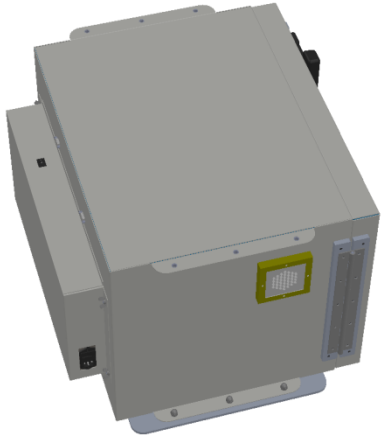


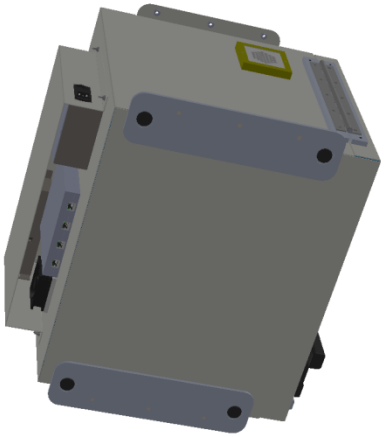
octoBox-26L quadStack

octoBox-38L triStack

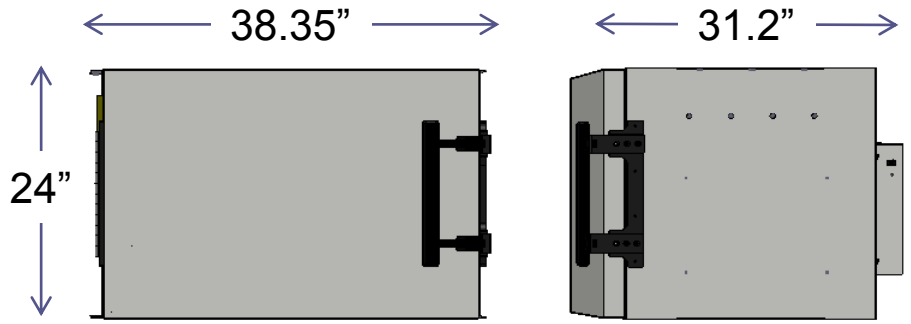
Single Chamber Configuration

Top View

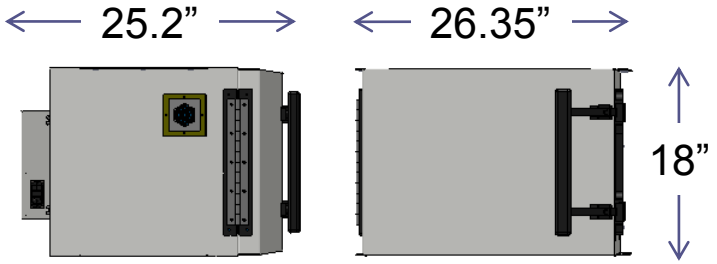




Bottom View



octoBox-38L



octoBox-26L

octoBox-26 Specifications

Feature	Specification	Notes
AC power entry module	IEC-320 C14 inlet connector 120/240VAC 50/60Hz 6A 5x20mm fuse	With built-in RF filter for isolation
Cooling	80mm square axial fan 4" honeycomb filters over inlet and outlet for isolation	Honeycomb filters provide RF isolation on fan inlet and outlet
Filtered high speed data connections	gigEthernet (with PoE), USB or DC power ports	Standard configuration: dual Optional configuration: quad
RF ports	8 RF barrel connector ports	Standard configuration: SMA Optional configuration: N-connectors
Isolation	>80 dB, fully cabled setup, up to 6 GHz	
Absorption	>20 dB absorption	1.3 GHz to 40 GHz
Outside dimensions (single box)	18”H x 26.35”W x 25.2”D	
Inside dimensions (single box)	13.35”H x 19.35”W x 13.35”D	
Outside dimensions (quadStack)	6’6”H x 26.36”W x 25.2”D Base: 34”W x 28.5”D	Base is wider for stability of the stack
Box material	16 gauge (0.0598" thick) steel	Supports up to 40 LBS load per box
Weight	80 LBS each box 95 LBS base	

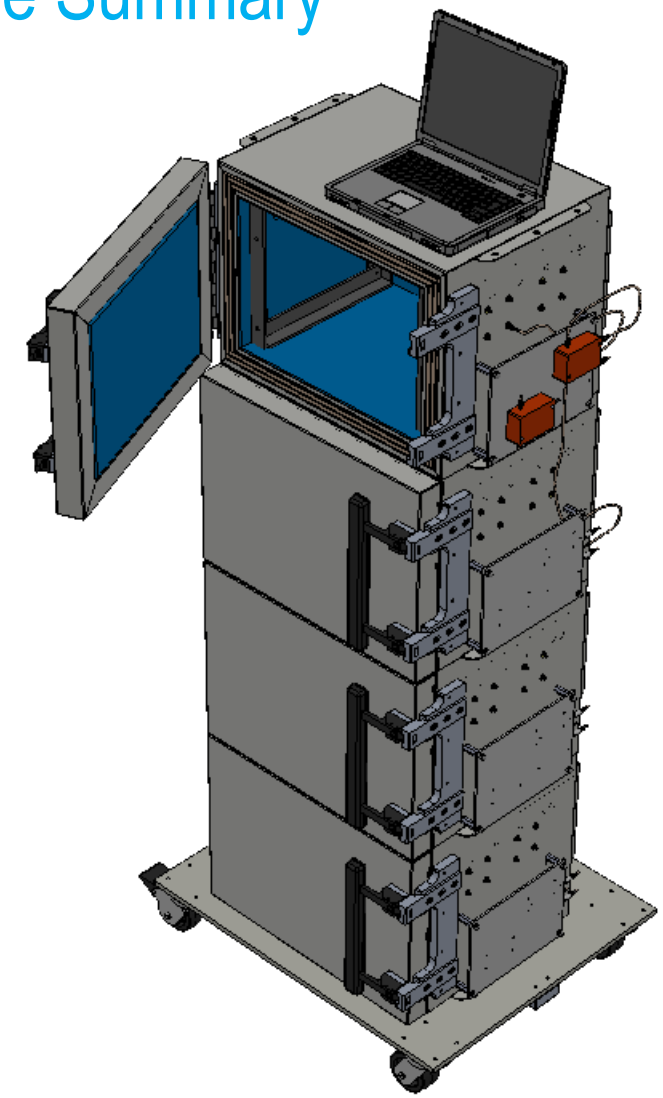
PoE = Power over Ethernet

octoBox-38 Specifications

Feature	Specification	Notes
AC power entry module	IEC-320 C14 inlet connector 120/240VAC 50/60Hz 6A 5x20mm fuse	With built-in RF filter for isolation
Cooling	80mm square axial fan 4" honeycomb filters over inlet and outlet for isolation	Honeycomb filters provide RF isolation on fan inlet and outlet
Filtered high speed data connections	gigEthernet (with PoE), USB or DC power ports	Standard configuration: dual Optional configuration: quad
RF ports	8 RF barrel connector ports	Standard configuration: SMA Optional configuration: N-connectors
Isolation	>80 dB, fully cabled setup, up to 6 GHz	
Absorption	>20 dB absorption	1.3 GHz to 40 GHz
Outside dimensions (single box)	24” H x 38.35”W x 31.2”D	
Inside dimensions (single box)	19.35”H x 31.5”W x 21. 5”D	
Outside dimensions (quadStack)	6’6”H x 38.35”W x 31.2”D Base: 42”W x 30.5”D	Base is wider for stability of the stack
Box material	14 gauge (0.0747" thick) steel	Supports up to 60 LBS load per box
Weight	150 LBS each box 100 LBS base	

octoBox Stackable – Feature Summary

- **Robust stackable design with support for over the air RF signal coupling**
- **Optional RF combiner-attenuator module**
- **Plastic (RF-transparent) mounting for test fixturing**
  - e.g. shelves, RF combiners, RF attenuators, etc.
- **Base with casters for easy moving – with locking breaks**
- **Cooling**
- **Power entry module with integrated filter, fuse and switch**
- **Up to 4 filtered high speed data filter module**
  - Ethernet or USB
  - Gigabit Ethernet and PoE support
- **8 bulkhead RF ports**



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