octoScope

octoScope Introduction

June 2017

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octoScope Company Summary

Company

Wireless test solutions and services for Wi-Fi, LTE, IoT and other wireless markets

- → Founded in 2006 as a wireless technology consulting company
- → Transitioned to product revenue in 2013
- → Now offering test solutions for Wi-Fi, 4G, 5G, IoT (Bluetooth, Nest), wireless broadband, connected car, medical devices, robotics, public safety, military

Product

Compact, modular, completely isolated and controllable wireless testbed

- → Automated, repeatable and accurate metrics of wireless performance & behavior
- → Patented novel technology for emulating real-life RF environment
- → Wireless performance, coexistence, behavior testing in controlled RF environment

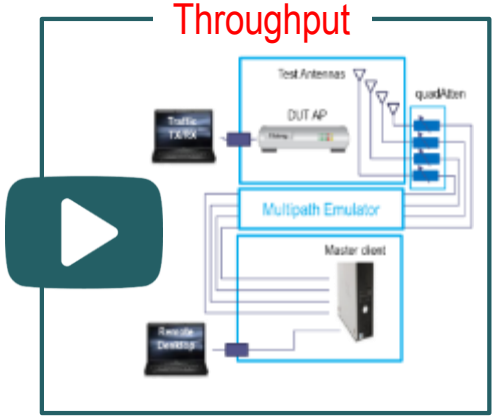
Team

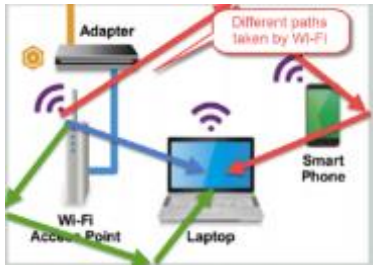
Wireless test, channel emulation, wireless protocols and RF

- → Track record of delivering successful communications and wireless test products
- → Key team members worked together going back to mid-1980s at prominent test equipment companies including Teradyne, HP/Agilent, Tektronix and Spirent

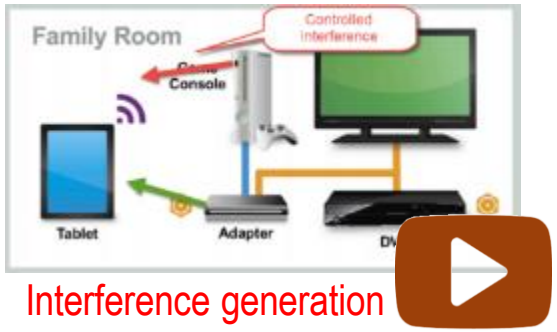
octoBox Testbed Summary

Throughput



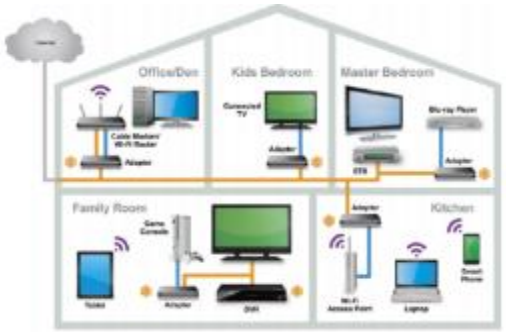


Multipath emulation



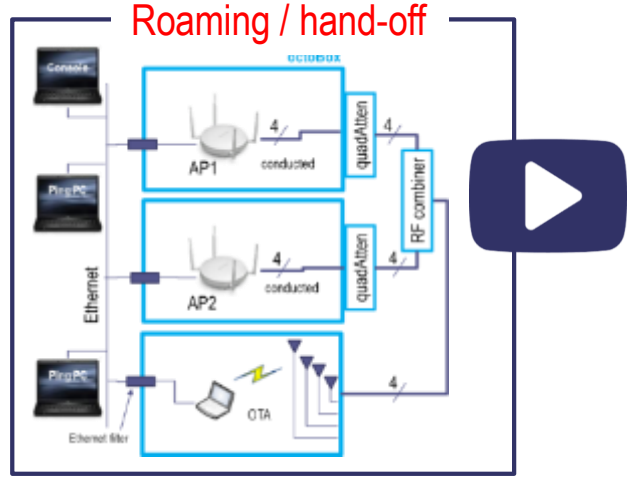
Interference generation

Traffic partner, station emulation



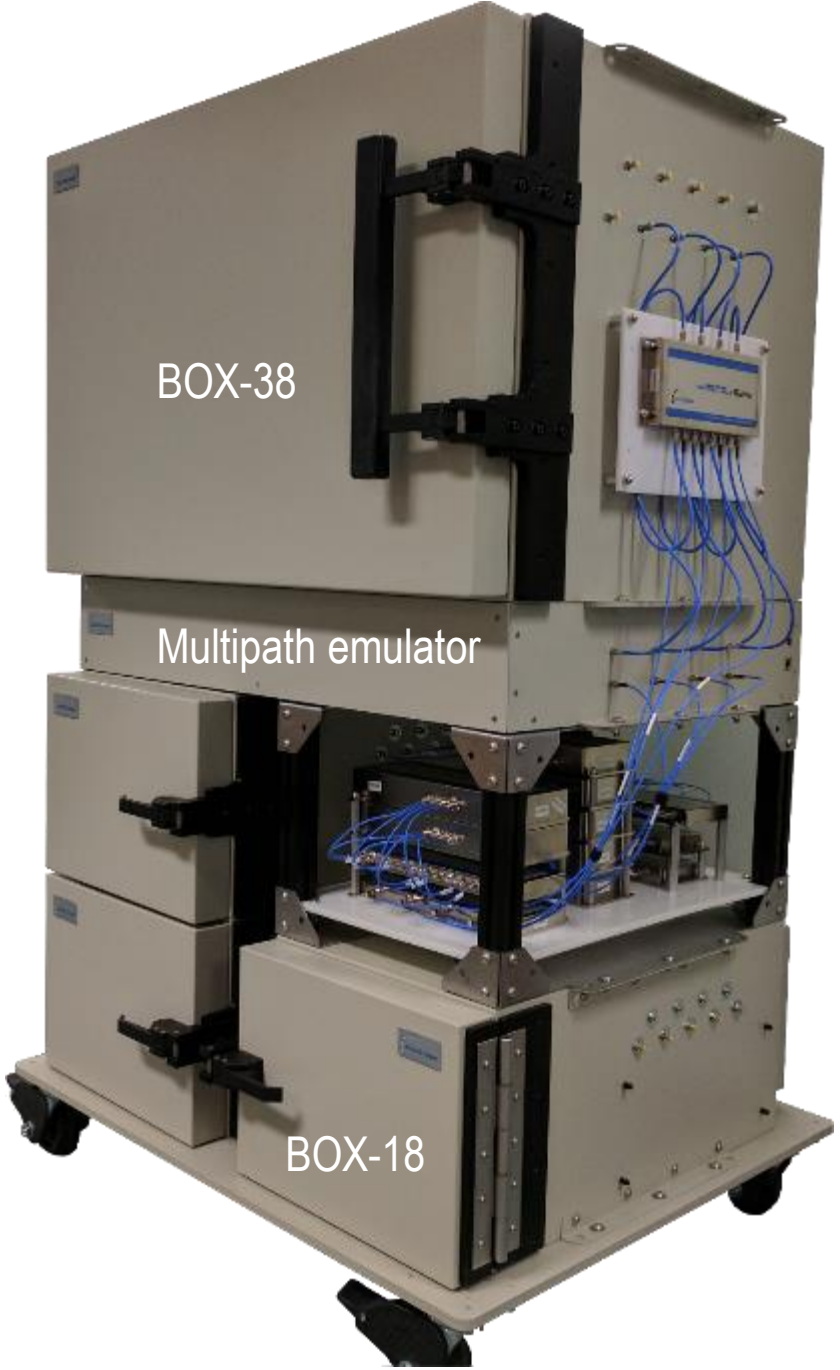
Video and multi-room emulation

Roaming / hand-off



octoBox Benefits

- Reduce wireless test time from weeks to hours
  - Complete isolation and repeatable RF environment minimizes time-consuming open-air testing
  - Automation accelerates data collection, improves test coverage and product quality
- Demonstrate highest achievable performance
  - Ideal MIMO environment for highest possible throughput
  - Supports latest technologies, such as 160 MHz 802.11ac, 802.11ax, MU-MIMO and Beamforming
- Qualify User Experience
  - Emulate real-world challenges
  - Programmable range of condition from best MIMO environment to challenging real-life impairments



octoScope Customers

Operators

vodafone
TELECOM ITALIA
Charter COMMUNICATIONS
orange
COMCAST
airtel
Telstra
Chunghwa Telecom
belgacom
CenturyLink
TELUS
at&t
upc
Google
swisscom
verizon wireless
Sprint
T-Mobile
Telefonica

Labs

SmallNetBuilder Real Help For Your Small Network
Wi Fi ALLIANCE
CETECOM
UL
TÜV
iol
AT4 WIRELESS a DEKRA company
KYRIO
CableLabs
esa European Space Agency

Chipset vendors

QUALCOMM ATHEROS
BROADCOM
MARVELL
Ralink
REALTEK
Quantenna Communications

Equipment vendors

Nokia Siemens Networks
CISCO
SONY
softathome
D-Link
ARUBA networks
Google
ASUS
ASKEY
NETGEAR
belkin
AVAYA
Ruckus Simply Better Wireless
Airgain
Calix
SONOS
SPACEX
AVM
SECURIFI
technicolor
ALPHA Alpha Networks Inc.
DELL
FORTINET
iRobot
COMPAL
Stoneridge
PHILIPS
symbotic
EDIMAX NETWORKING PEOPLE TOGETHER
HARRIS

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Wireless Test Applications

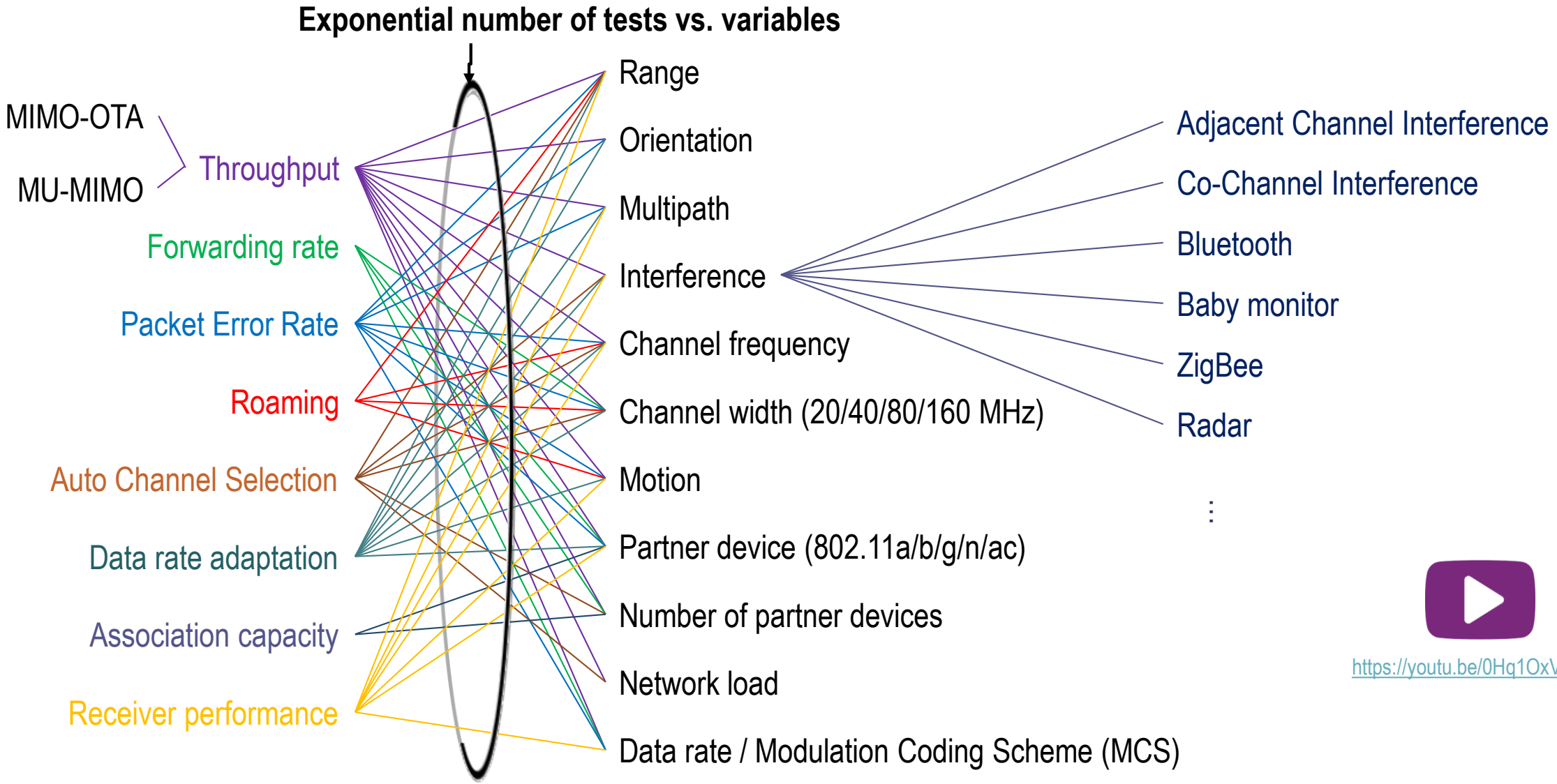
- Performance testing
  - MIMO OTA throughput
  - MU-MIMO gains
  - Load testing
  - Roaming
  - RX sensitivity
- User experience
  - Adaptation to impairments, such as path loss, interference, multipath, load
  - Roaming behavior – find sticky clients
  - DFS (dynamic frequency selection)

Summary of Pal Features and Capabilities

Linux Yocto OS

	2.4/5 GHz 3x3 radio *QCA9880 3x3 80 MHz*	**2.4 GHz 4x4 radio (wave 2)** *QCA9984 4x4 160 MHz*	**5 GHz 4x4 radio (wave 2)** *QCA9984 4x4 160 MHz*
MIMO-OTA	√	√	√
MU-MIMO, beamforming			√
Channel width	20/40/80 MHz	20/40 MHz	20/40/80/80+80/160 MHz
AP	√	√	√
STA (client)	√	√	√
Virtual STA, vSTA	32	32	32
Traffic replay	√	√	√
Monitoring	√	√	√
2.4 GHz	√	√	
5 GHz	√		√

Tests Supported by the octoBox Testbed

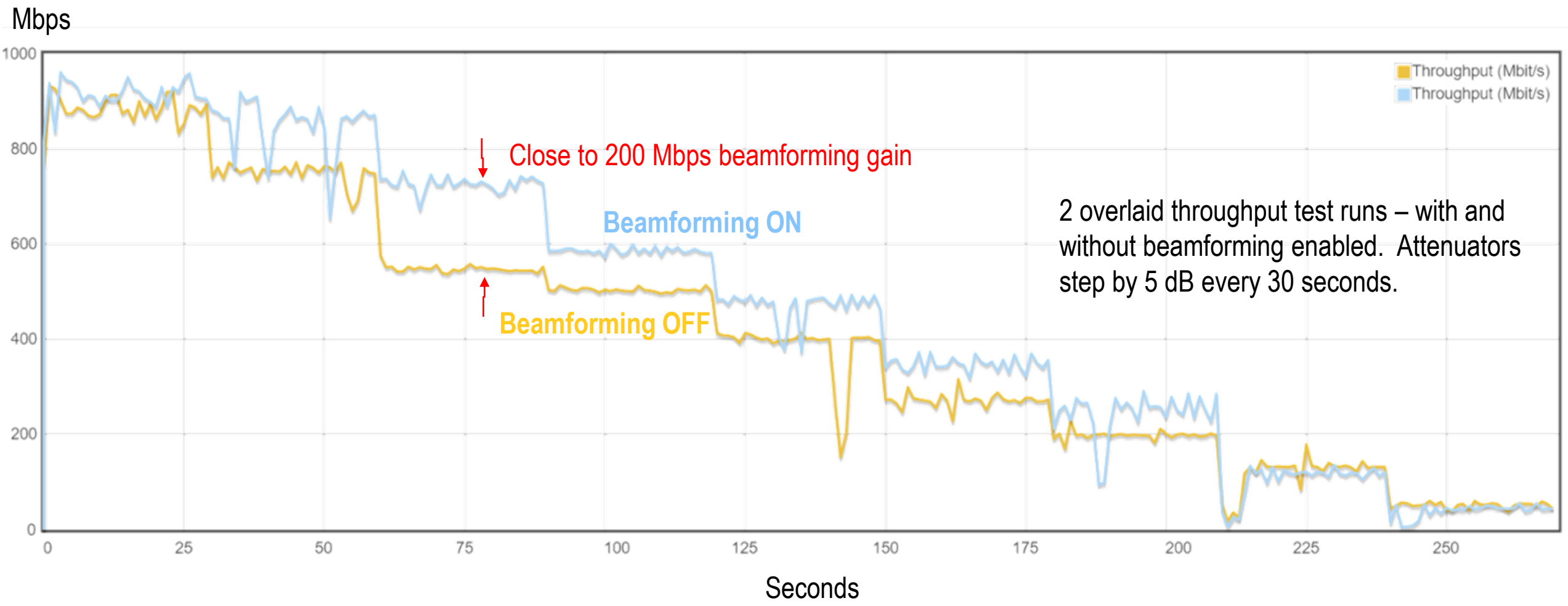


https://youtu.be/0Hq1OxVaAwk

MIMO = multiple input multiple output
MU-MIMO = multi-user MIMO

Throughput Script Browser Based User Interface

Configuration | Test Result

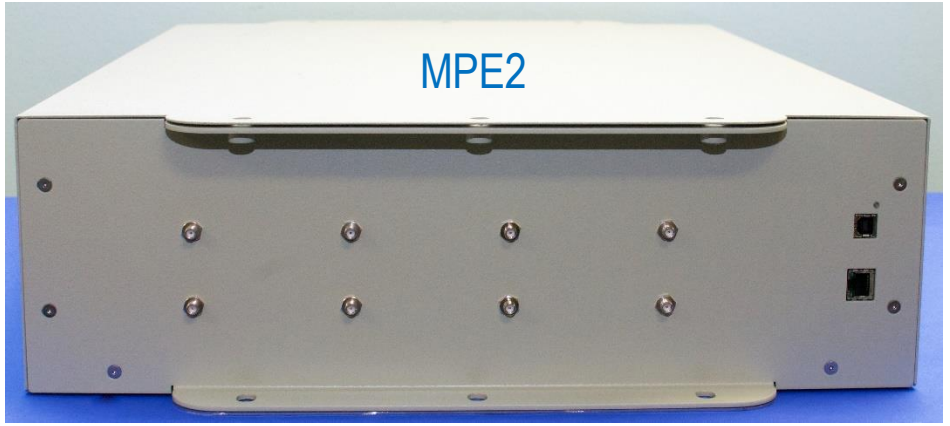


Roaming, Coexistence, Mesh, Large Scale Network Testing, …

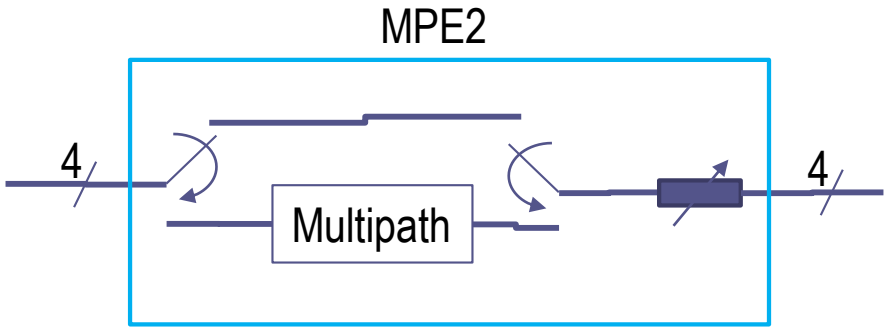
Flexible network topology configurations are possible with octoScope's completely isolated MIMO splitters.

Unique Patented Multipath Emulator (MPE) Technology

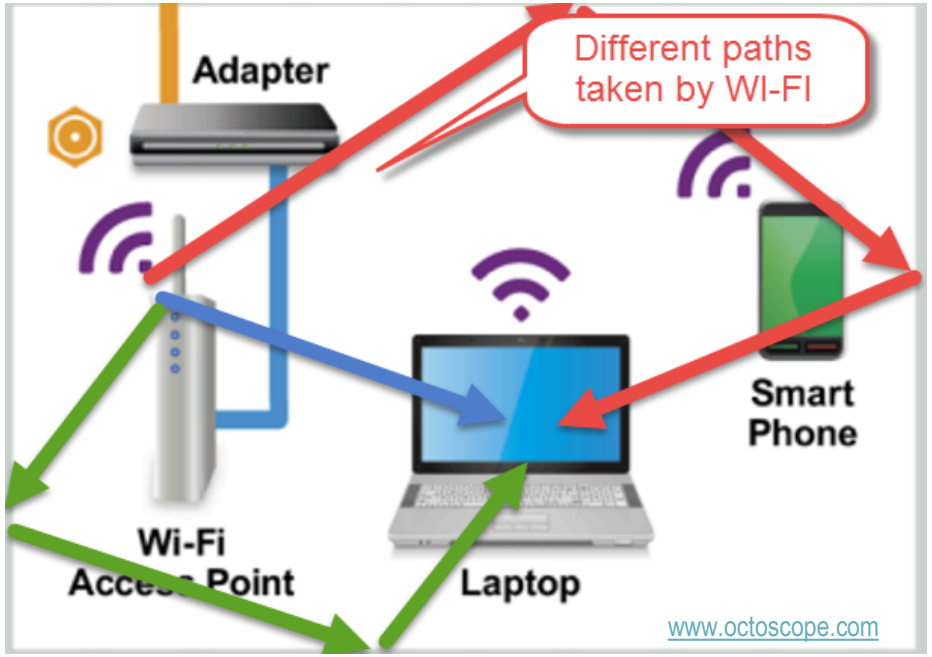
- Broadband (DC – 6 GHz) multipath emulator
- Accurately emulates a home channel model (IEEE 802.11 model B)
- Built-in bypass switch for LOS conditions
- Built-in programmable attenuators for range testing
- 4x4 MIMO link



US Patent # 20140241408A1



LOS = line of sight



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