DVTEST

RF Detective

Multi-Channel Spectrum Monitoring

SEE. EXPOSE. CAPTURE.

See into the complete RF system (up to 72 Channels) with 24/7 accessibility. Have remote access and receive real time alerts from anywhere in the world.

Expose interference and rogue in-band signals affecting RF system performance using spectrograms and mask (limit) test monitoring.

Capture intermittent and hard to find RF signals using the latest real time spectrum analysis technology. Have confidence with 100% probability of intercepting signals >100µs in up to a 40MHz span.

NEED

Today's wireless systems are becoming more complex and the expansion of the "internet of things" is creating more RF interference than previously known. This drastic change is creating obstacles for provisioning, managing, and troubleshooting RF systems. For example; Service Level Agreements are not limited to open air environments, but are also required in dense urban jungles, and within the cement confines of stadiums and skyscrapers.

Common issues in testing today's RF networks

- Poor visibility into RF ecosystem
- Interference is typically intermittent
- Traditional spectrum analyzers may not detect suspect interferers
- Inaccessibility to certain regions or areas for effective troubleshooting
- Locating the problem areas once on site
- Requirement to leave costly instrumentation on site to find problems
- Complex software tools may lead to false diagnoses
- Interference analysis and hunting is challenging and requires experience

SOLUTION

The RF Detective solves complex problems. It utilizes the latest real time spectrum analysis technology to isolate and find interferences. The Remote Switch Modules controls each branch of RF networks and detects the source of interference. By implementing multiple RF ports, **one RF Detective system** monitors up to **72 different RF channels**.

Advantages of using the RF Detective

- Full visibility into RF ecosystem
- Interference is seen and caught in real time
- Remote Switch Modules provide RF control to inaccessible areas
- Total control for finding and isolating interference sources
- Access on-site or remotely through a wireless or wired connection
- 100% probability of intercept of >100µsec signals in up to 40 MHz span

Low cost of ownership

- Fewer on-site visits
- Additional service revenue from improved coverage
- Simultaneously monitor multiple sites
- RF Switch Modules require fewer insertions, reducing wear on components
- Ruggedized chassis option available for harsh environment installations
- Economical solution - low cost per RF channel

FEATURES

RF Performance

- Real-time 9kHz to 6.2GHz spectrum analysis coverage
- +20dBm to -160dBm measurement range
- 100% probability of intercept of >100µsec signals in up to 40MHz span
- 27 spectrum and signal analysis measurements standard

Flexibility

- Up to 72 channels with programmable RF switches
- Field upgradeable switch modules
- Compatible with all DAS networks
- Desktop, rackmount, or ruggedized versions

Scalability

- Each chassis has 3 RF module slots
- Up to 24 channels supported per chassis (using 3x8 channel RF modules)
- Remote switch module provides additional RF control over distributed RF systems
- Up to 3 chassis can be supported using a master-slave configuration

Accessibility

- Control the RF Detective using ethernet or USB
- HDMI output for on-site or desktop analysis
- 5x USB 3.0 ports for adding additional peripherals (mouse, keyboard, power sensor, slave unit)
- Remotely access hardware from any browser

APPLICATIONS

- In-building Distributed Antenna System (DAS) installations
- Large event communication monitoring and optimizing
- Interference analysis and trending
- RF monitoring of sites where access is limited due to security clearance or hours of operation

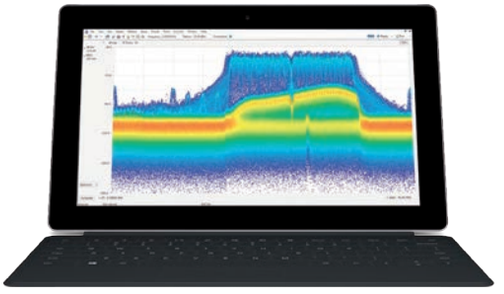
MARKETS

- Mobile network operators
- Public transportation, airports, financial institutions
- Hospital communications
- Military
- Public safety
- Two-way radio

SPECIFICATIONS

Chassis: RFDT	RF Detective Chassis
Number of Module Bays	3
Maximum Number of Slave Chassis	2
External RF Reference Input	1x SMA Female
External RF Trigger	1x SMA Female
External Peripheral Ports	5x A type USB 3.0, 1 Front, 4 Rear
RF Auxiliary Input Ports	2x SMA Female
RF Input/ Bypass Ports	2x N Type Male
Remote Control	1x Gigabit Ethernet , 1x USB host (on slave)
Video Display Output	HDMI
Power Supply	90–274VAC@47–63Hz, -48VDC
Additional DIO	15 pin Phoenix connector

Chassis: CT	RF Detective Chassis Controller
Processor Speed	Intel Core i7 5557U 3.1GHz
Memory	8GB DDR3L
Hard Drive	500GB - SATA 3Gb/s SSD



Chassis: SA	RF Detective Chassis Built in Spectrum Analyzer
Frequency Range	9kHz – 6.2GHz
IF Bandwidth	40MHz
Dynamic Range	+20 dBm to -154 dBm
Input Impedance	50 Ohms
VSWR	< 1.8
ADC Sample Rate and Bit Rate	112Ms/s, 14 Bits
Probability of Intercept	100% POI of 100 µsec signals in up to 40 MHz span
Channel Amplitude Flatness	±1.0 dB, 18 °C to 28 °C
Residual Spurious Response	< -85 dBm (Reference level ≤ -50 dBm, RF input terminated with 50 Ω)
3RD Order Intercept	
Center Frequency 2130 MHz	≥ +10 dBm at reference level -15 dBm, 18 °C to 28 °C

SPECIFICATIONS

Module: 240001003	8 Channel RF Input Module
Frequency Range	DC–16GHz
Number of RF Channels	8
Connection Type	SMA Female
Isolation	>75dB@DC-4GHz, >70dB@4–8GHz
Impedence	50 Ohms

Module: 240001003LP	8 Channel RF Input Module (Low Pim)
Frequency Range	DC–12.4GHz
Number of RF Channels	8
Connection Type	SMA Female
Isolation	>70dB@DC-4GHz, >60dB@4–8GHz
PIM Standard	Better than -162dbc at 2x35dbm
Impedence	50 Ohms

Module: 099302-NPIM	Remote Switch Module
Control Protocols	802.11, USB, and Ethernet
Frequency Range	DC–16GHz
Number of RF Channels	1x Input, 2x Output
RF Connections	3x N female
Input Power Options	18–48VDC, POE
Impedence	50 Ohms

Module: 099301-LPIM	Low PIM Remote Switch Module
Control Protocols	802.11, USB, and Ethernet
Frequency Range	DC–12.4GHz
Number of RF Channels	1x Input, 2x Output
RF Connections	1x DIN female (In), 1x N female (Out), 1x DIN female (Out)
PIM Standard	Better than -162dbc at 2x35dbm
Input Power Options	18–48VDC, POE
Impedence	50 Ohms

Figure 1
40MHz real time bandwidth allows capture of wideband signals such as WLAN, while showing intermittent narrow pulses such as Bluetooth.

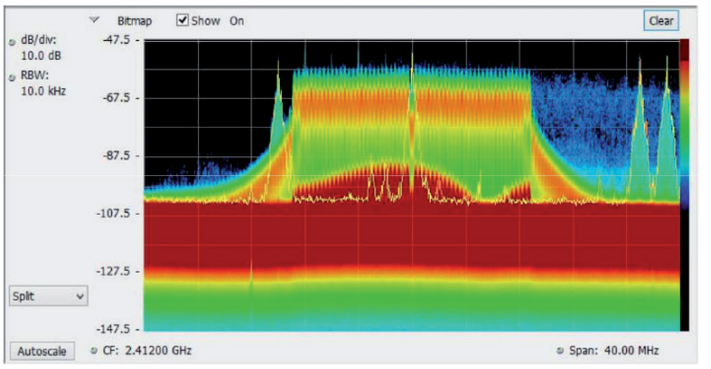


Figure 2
The Spectrogram shows these signals captured over a period of time. It is clear to see that the Wi-Fi signal is predominantly static, while the Bluetooth pulses surge over the spectrum.

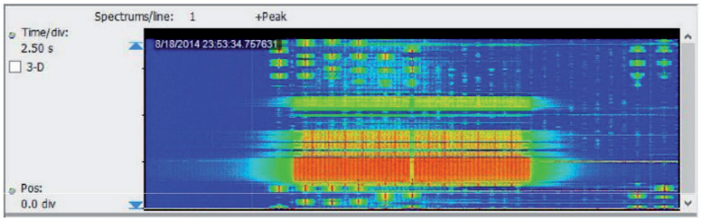
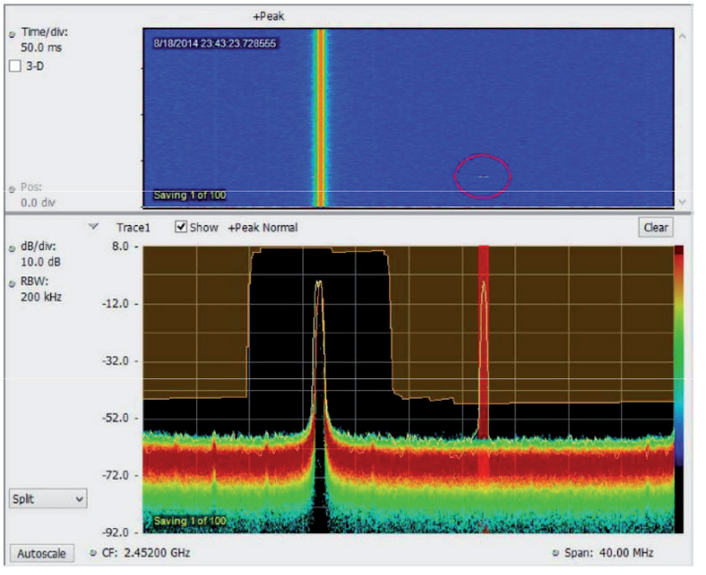


Figure 3
Mask (limit) lines can be set up to capture intermittent signals which are only present for short periods of time (100% probability of intercept for traces >100µs). Spectrograms can also be used to capture important data before, during, and after a violation or trigger has occurred.

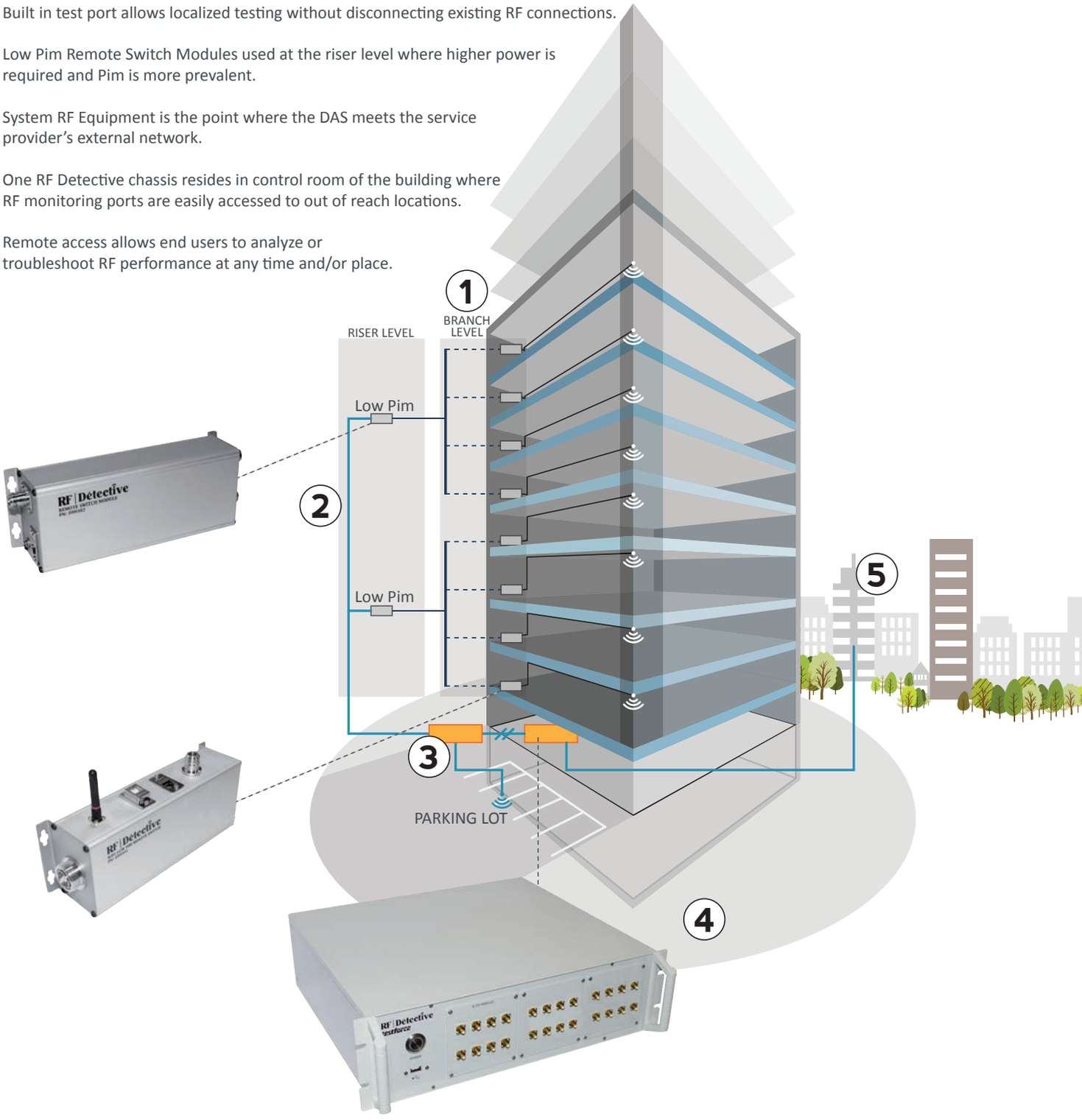


DISTRIBUTED ANTENNA SYSTEM

Typical Distributed Antenna System (DAS) Installation

DAS installations are becoming a more common place, and poor performance equals revenue reduction for customer and provider. Any changes to infrastructure will require complete testing of the entire system, as access to individual floors requires tenant approval.

1. Remote Switch Modules used to control RF service to each individual floor or branch. Built in test port allows localized testing without disconnecting existing RF connections.
2. Low Pim Remote Switch Modules used at the riser level where higher power is required and Pim is more prevalent.
3. System RF Equipment is the point where the DAS meets the service provider's external network.
4. One RF Detective chassis resides in control room of the building where RF monitoring ports are easily accessed to out of reach locations.
5. Remote access allows end users to analyze or troubleshoot RF performance at any time and/or place.



CONFIGURATOR

Configuring the RF Detective can be done in three simple steps:

1 Pick **Chassis** options:		2 Pick **Module** options:		3 Pick **External Add-on Module** options:	
CT	RF DETECTIVE CHASSIS CONTROLLER	8RF (240001003)	8 CHANNEL RF INPUT MODULE	NPIM (099302)	NON LOW PIM REMOTE SWITCH MODULE
SA	RF DETECTIVE CHASSIS BUILT IN SPECTRUM ANALYZER	8LP (240001003)	8 CHANNEL RF INPUT MODULE (LOW PIM)	LPIM (099301)	LOW PIM REMOTE SWITCH MODULE

CHASSIS OPTIONS

RFDT CT SA

1

Sample Code: RFDT-CT-SA

Main Chassis
- RFDT = RF Detective Chassis

RF Detective Chassis Controller (CT OR 00)
- CT = RF Detective Chassis should INCLUDE a Chassis Controller
- 00 = RF Detective Chassis should EXCLUDE a Chassis Controller

RF Detective Chassis Built-In Spectrum Analyzer Options (SA OR 00)
- SA = RF Detective Chassis should INCLUDE a built-in Spectrum Analyzer
- 00 = RF Detective Chassis should EXCLUDE a built-in Spectrum Analyzer

SWITCH MODULE OPTIONS

8RF1 8LP2

Module Bays (Maximum of 3 total Bays. Select 8RF AND/OR 8LP Modules)

2

Sample Code: 8RF2-8LP1

8 Channel RF Input Module
- 8RF0 = Zero 8 Channel RF Input Modules
- 8RF1 = One 8 Channel RF Input Modules
- 8RF2 = Two 8 Channel RF Input Modules
- 8RF3 = Three 8 Channel RF Input Modules

8 Channel RF Input Module (Low Pim)
- 8LP0 = Zero 8 Channel RF Input Modules (Low Pim)
- 8LP1 = One 8 Channel RF Input Modules (Low Pim)
- 8LP2 = Two 8 Channel RF Input Modules (Low Pim)
- 8LP3 = Three 8 Channel RF Input Modules (Low Pim)

EXTERNAL ADD-ON MODULE OPTIONS

NPIM POE

3

Sample Code: NPIM-POE

Remote Switch Module
- NPIM = Non Low Pim
- LPIM = Low Pim

Input Power (DC OR POE)
- DC = 18-48VDC
- POE = Power over Ethernet

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