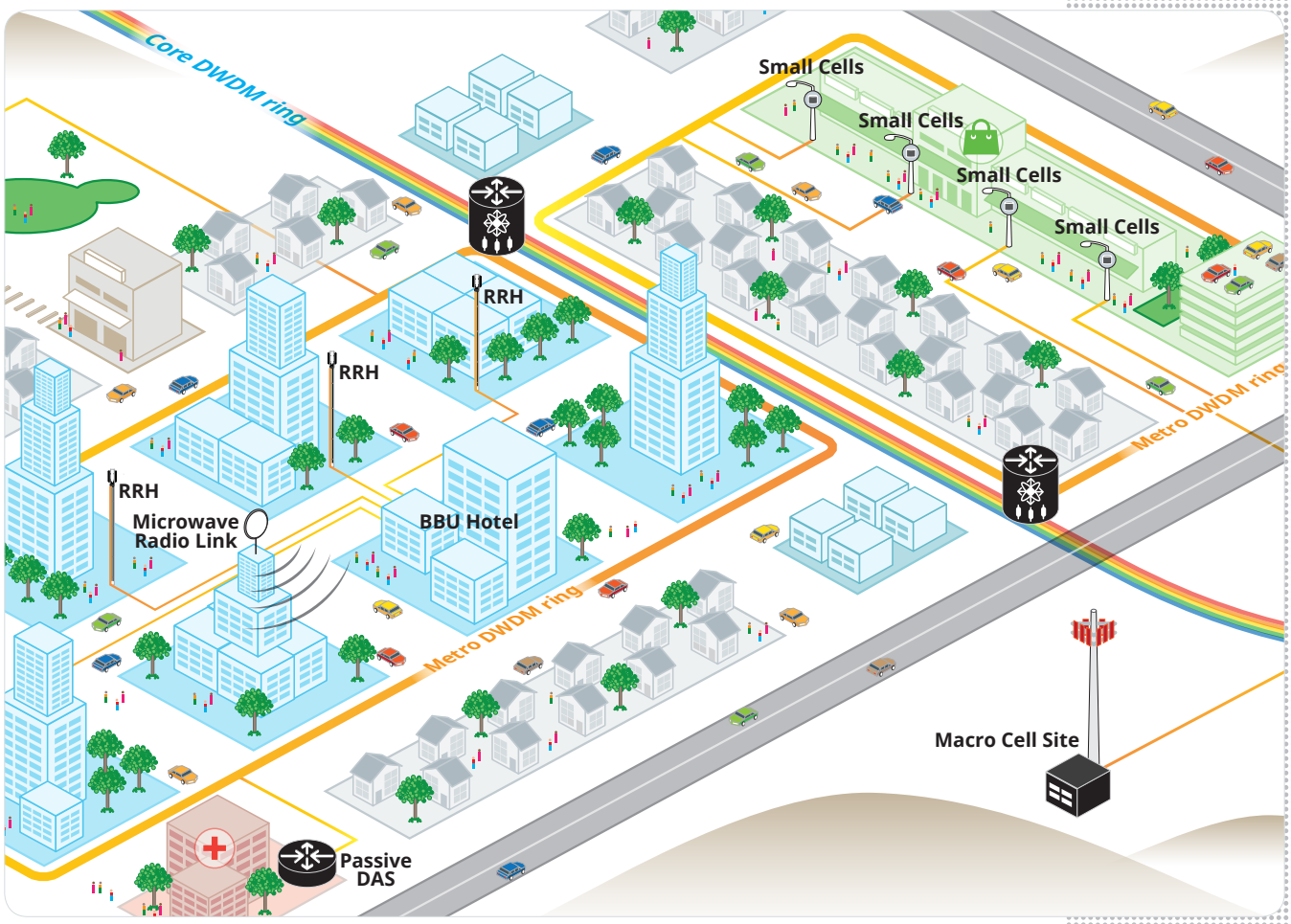
Solutions Brochure

Anritsu envision : ensure

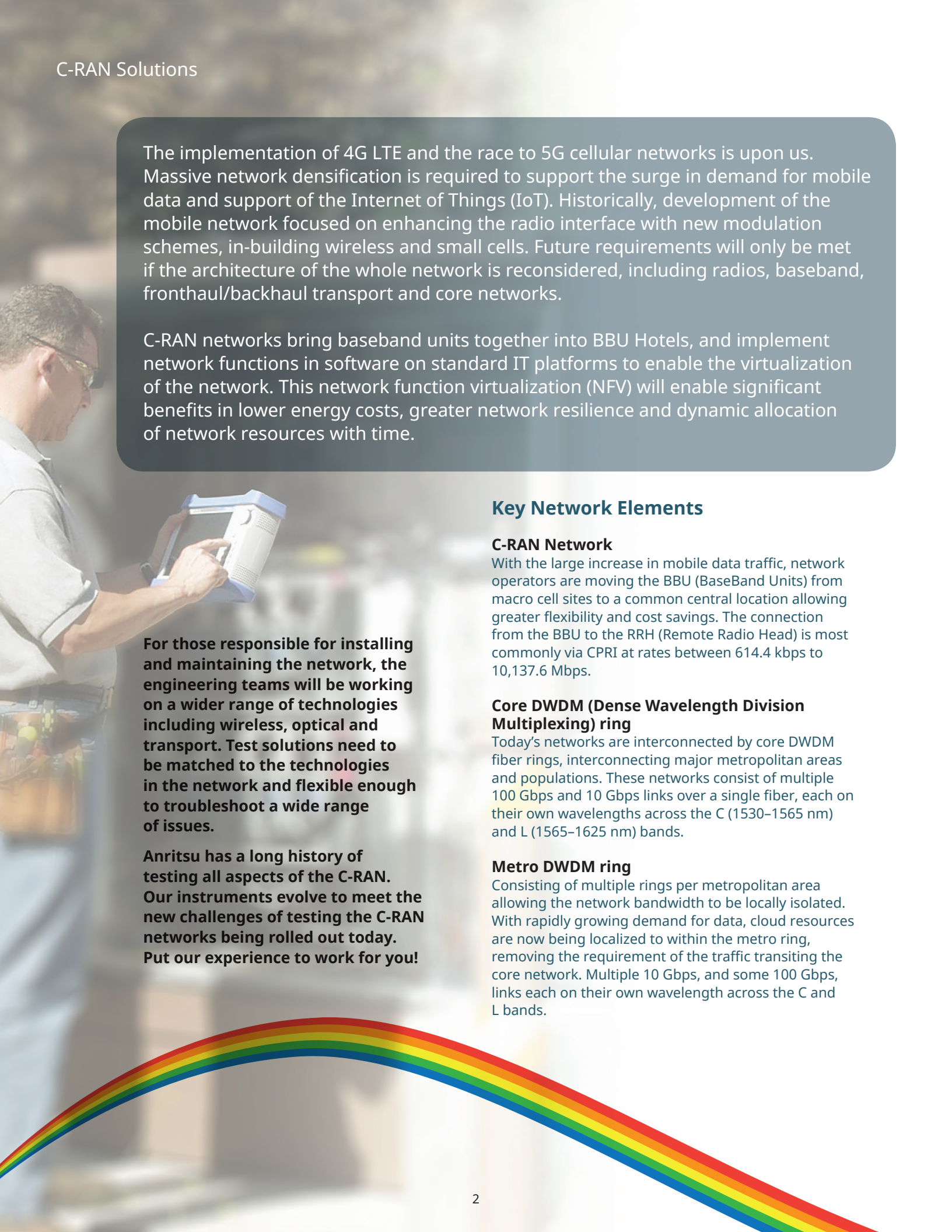
C-RAN Solutions

Transport, Optical & RF Testing for all Elements of the C-RAN Network



The implementation of 4G LTE and the race to 5G cellular networks is upon us. Massive network densification is required to support the surge in demand for mobile data and support of the Internet of Things (IoT). Historically, development of the mobile network focused on enhancing the radio interface with new modulation schemes, in-building wireless and small cells. Future requirements will only be met if the architecture of the whole network is reconsidered, including radios, baseband, fronthaul/backhaul transport and core networks.

C-RAN networks bring baseband units together into BBU Hotels, and implement network functions in software on standard IT platforms to enable the virtualization of the network. This network function virtualization (NFV) will enable significant benefits in lower energy costs, greater network resilience and dynamic allocation of network resources with time.



For those responsible for installing and maintaining the network, the engineering teams will be working on a wider range of technologies including wireless, optical and transport. Test solutions need to be matched to the technologies in the network and flexible enough to troubleshoot a wide range of issues.

Anritsu has a long history of testing all aspects of the C-RAN. Our instruments evolve to meet the new challenges of testing the C-RAN networks being rolled out today. Put our experience to work for you!

Key Network Elements

C-RAN Network

With the large increase in mobile data traffic, network operators are moving the BBU (BaseBand Units) from macro cell sites to a common central location allowing greater flexibility and cost savings. The connection from the BBU to the RRH (Remote Radio Head) is most commonly via CPRI at rates between 614.4 kbps to 10,137.6 Mbps.

Core DWDM (Dense Wavelength Division Multiplexing) ring

Today's networks are interconnected by core DWDM fiber rings, interconnecting major metropolitan areas and populations. These networks consist of multiple 100 Gbps and 10 Gbps links over a single fiber, each on their own wavelengths across the C (1530–1565 nm) and L (1565–1625 nm) bands.

Metro DWDM ring

Consisting of multiple rings per metropolitan area allowing the network bandwidth to be locally isolated. With rapidly growing demand for data, cloud resources are now being localized to within the metro ring, removing the requirement of the traffic transiting the core network. Multiple 10 Gbps, and some 100 Gbps, links each on their own wavelength across the C and L bands.

Macro Cell
A cell in a mobile phone network that provides network coverage using a high power cellular radio base station. The macro cell may be mounted on a tall building or a dedicated radio tower. Typically, the base transceiver station (BTS) radios are located in an equipment room at the base of the tower or on the rooftop. High power radios provide coverage up to 20 km. Connection back to the core network is typically by microwave link or optical fiber.

Small Cell
Low power radios used in the cellular network to provide densification in urban environments. Range may be limited to 0.5 km to 4 km. Typically the integrated radio is mounted on existing street infrastructure such as lampposts or on the side of a building.

Remote Radio Head (RRH)
Part of a distributed base station that locates the BBUs at the base of a cell tower, or even remotely at a BBU hotel, and the radios at the top of the tower close to the antennas. The compact RRH is connected to the BBU via a fiber optic cable, typically using CPRI protocols. Use of RRH reduces power loss in long RF cable runs and potentially improves network flexibility, especially to distribute load at peak times.

BBU Hotel
The name given to a single location which houses the baseband units of many distributed RRH. A BBU hotel can be many kilometers from the radio heads, typically using fibers running CPRI protocols between the two. By locating multiple BBU at a common location, radio resources can be allocated dynamically as demand changes. The radios can be mounted closer to the antenna which reduces RF cable losses and may improve PIM performance. OPEX may also be reduced as smaller equipment rooms and less cooling is required at each site.

Microwave Radio
A point to point radio link that is often used to connect remote cell sites back to the core network, in place of optical fiber.

DAS (Distributed Antenna Systems)
The most common method selected by operators and building owners to achieve in-building coverage and capacity. DAS are able to accept inputs from a variety of sources making them equipment manufacturer and technology neutral (2G, 3G, 4G).

Passive DAS
Signals from one or more RF sources are distributed throughout a venue using only passive components: coaxial cable, splitters and antennas. Sectorization is achieved by dedicated RF cable feeds to each antenna branch. Typically used for small DAS installations such as SME offices, conference centers and hotels.

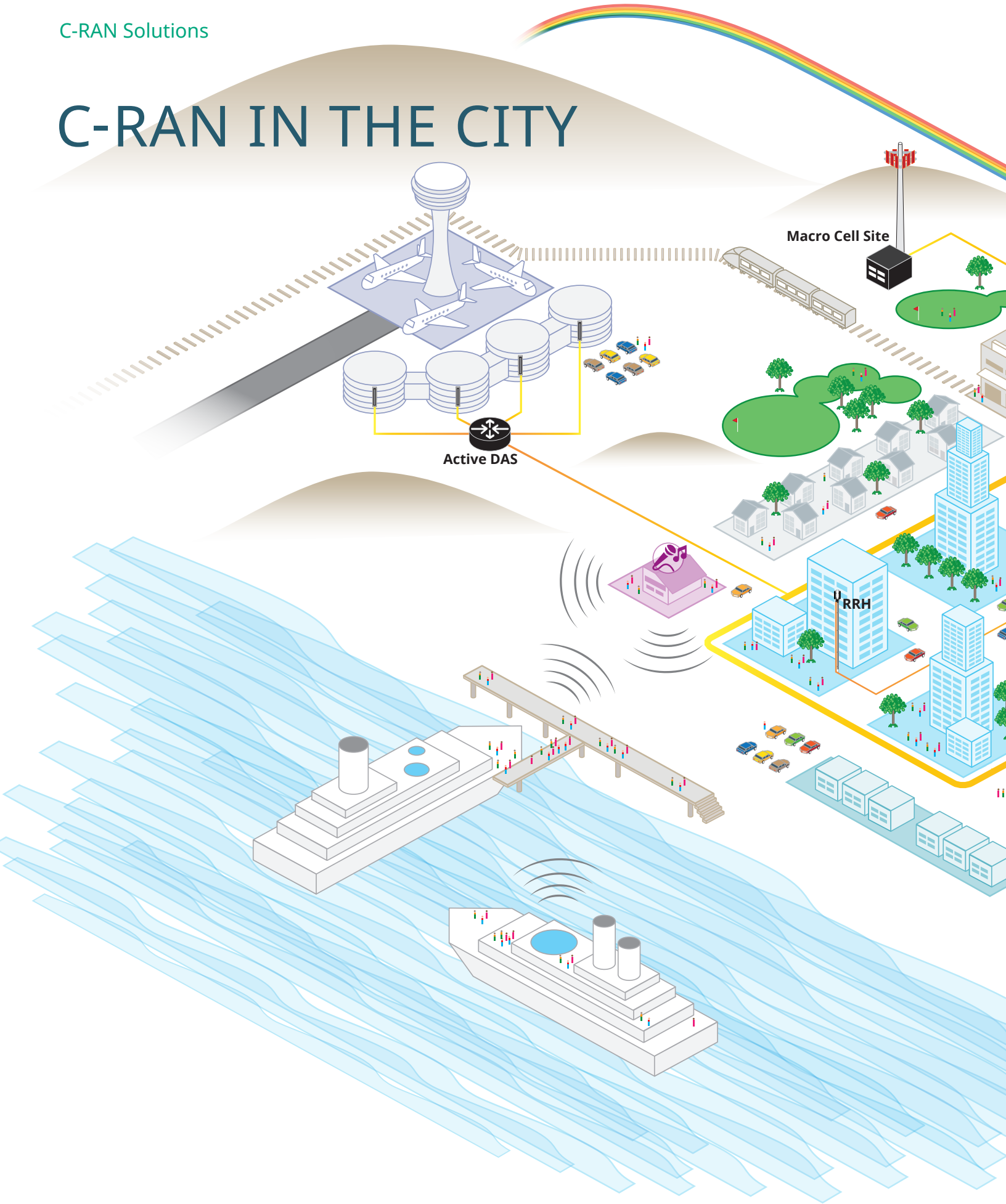
Active DAS
Downlink signals from one or more RF sources are conditioned, combined and converted to light for distribution over fiber cable to radio units located around the venue. Radio units convert the signal back to RF, amplify and re-broadcast them. This allows for greater range within the DAS and is typically used at large sports stadiums, airports and very tall buildings.

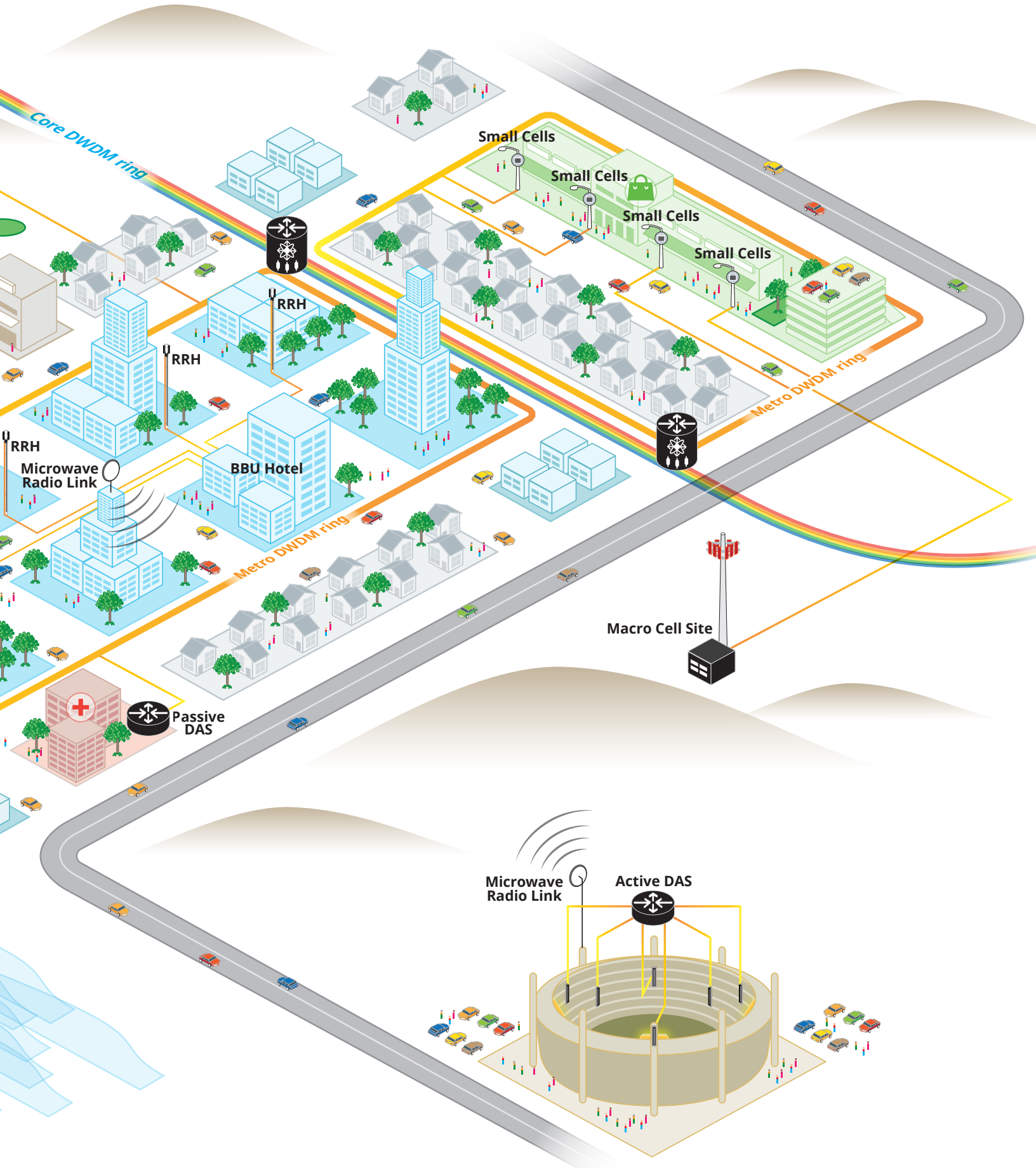
Network Interference
The best planned networks are subject to performance degradation from illegal or accidental radio interferers such as unlicensed radio microphones, radios on visiting commercial shipping, leaking cable TV cables or illegal FM transmitters.

Common Public Radio Interface (CPRI)
CPRI is an open specification for an interface between Radio Equipment Controllers (REC) often referred to as BBU, and Radio Equipment (RE), often referred to as RRH. The use of a CPRI interface run over a single mode or multi-mode fiber enables the radio equipment to be mounted at the top of a tower very close to the antennas. The BBU and RRH can be up to 25 km apart facilitating the use of BBU hotels so the network can be configured dynamically as demand changes. The latest specification version 7.0 supports up to 24 Gbps line rates.

Transport layer
A general term for the layer of the OSI Reference Model that provides connection services for high layer applications. Optical Transport Networks (OTN) run up to 400 Gbps, other transport technologies include: Ethernet, CPRI/OBSAI, SDH/SONET, PDH/DSn.

C-RAN IN THE CITY




Core DWDM ring
Small Cells
Small Cells
Small Cells
Small Cells
RRH
RRH
RRH
Microwave
Radio Link
BBU Hotel
Metro DWDM ring
Metro DWDM ring
Macro Cell Site
Passive
DAS
Microwave
Radio Link
Active DAS

Network Elements

	Core DWDM	Metro DWDM	Macro Cell	Small Cell	Remote Radio Head
Network Master MT1000A	●	●	●	●	●
Network Master MT1100A	●	●	●	●	●
Network Master MT9090A	●	●	●	●	●
Access Master MT9083x2	●	●			●
BTS Master MT8220T			●	●	●
Site Master S33xE			●		●
Site Master S331L			●		●
PIM Master MW82119B			●	●	●
SkyBridge Tools	●	●	●	●	●
Spectrum Master MS2720T			●	●	
Remote Spectrum Monitor MS2710xA			●		

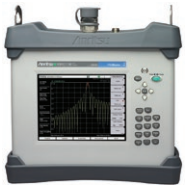
Anritsu Solutions for Every Network Element

Network Master™ Pro MT1000A
All in one optical cable and data transmission field test instrument for installation and maintenance engineers. The MT1000A supports transport testing from 1.5 Mbps to 10 Gbps, on Ethernet, OTN, SDH/SONET, PDH/DSn, fiber channel, CPRI and OBSAI. Optional OTDR and fiber visual inspection probes are available.

Network Master™ Flex MT1100A
All in one transport tester from 1.5 Mbps to 100 Gbps. Designed for R&D as well as field installation and maintenance, the MT1100A is carrier class Ethernet instrument for OTN core and metro networks implementing 100 GigE and OTN technologies. Test up to four independent 100 Gbps ports simultaneously or for R&D, MT1100A delivers 400 Gbps (100G x 4) by simulating client signals.

Network Master™ MT9090A
A modular palm sized platform for field technicians that can be optioned as an Optical Time Domain Reflectometer, CWDM Optical Channel Analyzer or 10/100/1000 Mbps Ethernet Analyzer.

Site Master™ Handheld Cable & Antenna Analyzer S331L
The S331L offers the highest value in a rugged, handheld cable and antenna analyzer for contractors, installers, and wireless service providers, who need an instrument to reduce site maintenance expenses. Optimized for RF line sweep measurements to 4 GHz, the S331L delivers an entire workday of battery operating time, the most ever offered in a handheld cable and antenna analyzer.



PIM Master™ MW82119B
PIM Master is a battery-operated, high power Passive Intermodulation (PIM) tester covering global cellular standards. PIM is a form of interference generated by components such as connectors, cable assemblies, filters, and antennas. When subjected to the downlink signals at a cell site, these normally linear components can generate spurious signals in the uplink path. PIM Master is a specialized test instrument able to measure system linearity and identify PIM locations both inside the cable system and beyond the antenna. An RF line sweep option is available to reduce the number of testers a field technician requires for each site visit.

SkyBridge Tools™
Anritsu's SkyBridge Tools™ cloud-based trace management tool brings simplified testing processes to the DAS installation workflow. SkyBridge Tools enables reliable and quick creation of test plans, enables fast and accurate testing across line sweep, PIM and OTDR measurements, and assists in report creation. This leads to less time testing, accurate tests, and reliable payment for work done.

BBU Hotel	Microwave Radio	Passive DAS	Active DAS	Network Interference	CPRI	Transport Layer
●			●		●	●
●					●	●
●			●			●
●			●			
●		●	●	●	●	
		●	●	●	●	
		●	●			
		●	●			
●	●	●	●		●	
	●			●		
				●		

ACCESS Master™ MT9083x2
This optical fiber analyzer is designed for installing and maintaining access, metro, or core networks. The MT9083x2 is a complete fiber test tool including; OTDR, light source, power meter, VFL and connector inspection microscope. The MT9083x2 features multiple wavelengths and options for all your CRAN testing needs to meet any network testing requirement access or metro, FTTx or LAN, MFH.

BTS Master™ MT8220T
The BTS Master is the complete test instrument for cellular base station installation and maintenance. Integrated into a single field portable instrument are; cable and antenna analyzer, spectrum analyzer, vector signal generator, interference analyzer with mapping, power meter, CPRI RF measurements and demodulation/analysis of all standard RF standards including 2G, 3G and LTE.

Site Master™ Handheld Cable & Antenna Analyzer S33xE Series
Anritsu Site Master was the first and remains the industry standard RF cable and antenna analyzer. When used with SkyBridge tools, Site Master automates the creation of test plans and provides one button tests, reducing test time by up to 90%, especially important when testing DAS systems that may include many hundreds of line sweep measurements. The range has frequency coverage up to 40 GHz. Options include a fully featured spectrum Analyzer and CPRI RF measurements to measure RF signals on an optical CPRI link.

Spectrum Master™ MS2720T
High performance field portable spectrum analyzer to 43 GHz. This fully featured spectrum analyzer includes a power meter, tracking generator, interference analyzer and channel scanner. Modulation analysis for 2G, 3G and LTE signals make this instrument ideal for base station testing as well as backhaul microwave link measurements.

Remote Spectrum Monitor MS2710xA
Remote Spectrum Monitors are designed for distribution around a large geographic area to monitor all RF transmissions to 6 GHz. Weatherproof IP67 models for outdoor installation and in building models with up to 24 RF ports for cell site monitoring are available. Centrally located Vision software monitors all transmissions, quickly identifying the sources of interference that degrade network performance. POA and TDOA algorithms quickly pinpoint interference for rapid identification and resolution.

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