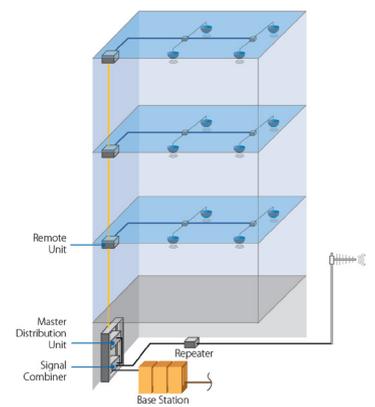


Essential Distributed Antenna Systems (DAS) Deployment Testing

DAS are becoming increasingly popular for delivering capacity and enhanced coverage to meet the staggering increases in bandwidth-hungry mobile apps, particularly within public venues and commercial buildings such as stadiums, shopping malls, airports, and enterprises. DAS installations generally consist of a signal combiner that takes signals from various radio frequency (RF) sources (on-site base stations or feeds from donor macro cells), a master distribution unit, remote units, and antenna runs—with or without splitters.

Although no two DAS installations are the same, a typical deployment is driven either by a direct connection to a radio base station or from a donor macro cell. Often, there are multiple RF feeds that are combined and then passed to a master distribution unit. The master distribution unit then feeds remote units via a variety of media—fiber, 75 ohm coax, or twisted pair. The remote units in turn feed the antenna systems via 50 ohm coax. Multiple antennas can be fed from a single remote unit via splitters.



Example of DAS architecture

DAS Challenges

DAS architectures can vary significantly and use a wide variety of physical media for connectivity. This creates a complex environment which, if not tested, validated, managed, and optimized, can have a detrimental effect on an end user's mobile experience.

These are just some of the challenges:

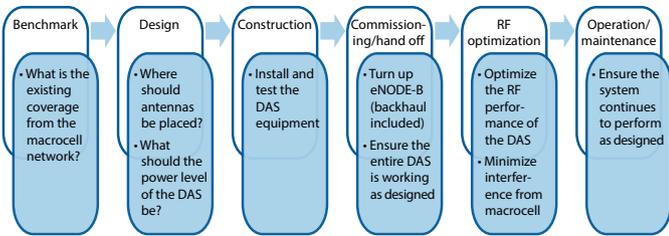
- How will you test and validate the RF?
- Has the coax, fiber, and twisted pair been installed correctly?
- Is poor physical media connectivity causing performance issues?
- Is there any RF interference?
- Are the antennas positioned optimally?
- How will I test the installation for mobile apps?

With tough acceptance standards, fewer technicians to cover complex floor plans, multiple RAN technologies, and little time to be confident in the DAS birth certificate, you need the right tools and solutions to get the job done on time and right—the first time.



DAS Life Cycle

With any new network, or if you are optimizing an already installed network, there are a number of phases that must be planned.



Benchmark and Design

Before any installation, you must have a clear understanding of what the current network is offering. This can involve assessing the existing macro coverage in terms of signal coverage, spectrum, and power. To quickly and accurately perform these kinds of assessments, RANAdvisor TrueSite is an ultra-portable solution with 3D dynamic mapping integrated with IBWave to perform RAN and app testing in real-time. And, the CellAdvisor Base Station Analyzer (BSA) provides a deep analysis of RF characteristics including spectrum and signal analysis, sweep testing, interference and PIM detection.

- Using an optical time domain reflectometer (OTDR) to characterize installed-fiber build quality
- Ensuring that 75 ohm and 50 ohm coax runs have acceptable return loss (RL/VSWR) and insertion loss (IL)
- Certifying twisted pair cabling meets the required category or class requirements (Category 6A, for example)

Fiber connectors can be inspected and certified using the JDSU P5000i digital probe microscope with a variety of handheld devices including Android devices and the SmartClass™ Fiber (SCF) instrument. Optical insertion loss measurements can be performed using the SCF or a Certifier40G. OTDR testing is done using the T-BERD/MTS-2000. Coax testing can be performed using the Certifier40G or CellAdvisor. Twisted pair certification can be performed using the Certifier40G.

Commissioning

At this stage, we are bringing the install into service. We can use the JDSU CellAdvisor Cable and Antenna Analyzer for RF testing (for example, DTF, VSWR). Uniquely, we can also test fiber from the same instrument. RANAdvisor TrueSite provides service testing mapped to position and RAN metrics. We may also need to test the backhaul depending on the DAS architecture with the T-BERD®/MTS-5800.



Optimization, Operation, and Maintenance

Once the DAS is operational, we need to keep the RF characteristics optimized to ensure maximum service quality. RANAdvisor TrueSite lets us measure macro ingress and missing or faulty antennas as well as walk test mobile apps. The CellAdvisor BSA analyzes RF performance across a wide spectrum performs simple optical power measurements for fiber connector certification. For advanced detection and location of fiber faults or breaks, use the T-BERD/MTS-2000. And, monitoring backhaul with the JMEP solution will ensure optimized end-to-end service delivery.

JDSU is the only vendor that can truly surround a DAS cell site, ensuring optimal service through all life-cycle phases. With the ability to cloud-enable test results with StrataSync, you can trust JDSU to be with you every step of the way for any DAS deployment.

Construction

The main testing element at this stage is certifying that physical media meets the required performance specifications.

Typical tests include:

- Fiber inspection to certify the quality of the fiber connectors and measure insertion loss



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