Hotel Distributed Antenna System (DAS) Reference Document

Developed by:
In-Room Technology Workgroup
Infrastructure Team

About HTNG

Hotel Technology Next Generation (“HTNG”) is a nonprofit organization with global scope, formed in 2002 to facilitate the development of next-generation, customer-centric technologies to better meet the needs of the global hotel community.

Table of Contents

1 Document Changes

Version	Date	Author	Comments
V1.0	2/1/08	Team members	Initial draft – internal DAS team distro
	8/25/08	Kully/Hesskamp	Separation of Conformance & Spec docs
	11/14/08	Russ Johnson	Reformat to reference style document from specification, remove page breaks, add changes to section 4, add sectioning to section 5
	11/17/08	Kully	Updated Section 5 per new direction and incorporated RSS revised Section 4
	11/18/08	Klein	Incorporateed some changes and recommendations to clarify the document.
V1.5	12/2/08	Hesskamp	Updated Executive Summary and Use Cases
V2	1/12/09	Kully & team	Final workgroup review and edit entire doc
V2	3/12/09	Kully & Team	Final Updates to include LTE

2 Document Purpose

2.1 Document Purpose

The purpose of this document is to provide a reference document and RFP template for hoteliers and their technology consultants for the design, engineering, implementation of a multi-carrier, multi-service distributed antenna system (DAS).

This document was developed by the Infrastructure team of the HTNG In-Room Technology Workgroup.

2.2 Scope

The scope of this document includes, directly or by reference, information required to select and deploy a multi-carrier, multi-service distributed antenna system (DAS).

2.3 Audience

The intended audience of this document is hoteliers and hotel consultants interested in acquiring and deploying a multi-carrier and/or multi-service DAS or learning more about DAS equipment, design, installation, and support recommendations.

2.4 Overview

This document provides recommended requirements for DAS systems, including basic DAS functionality and specific applications that the DAS should support; signal strength, coverage, reliability, manageability, security, aesthetic, capacity, scalability and expandability requirements. In addition, implementation recommendations are provided including project scope, provisioning, installation, warranty and ongoing maintenance and support.

2.5 Document Terms

For the purpose of this document the following terms have been defined as follows:

Term	Definition
Antenna	RF radiating element providing actual signal coverage in the building
AWS	Advanced Wireless Services – a wireless telecommunications spectrum band
BDA	Bidirectional amplifier
BTS	Service Provider Base transmit receive station
DAS	Distributed Antenna System
Femto/Picocell	Smaller and lower capacity versions of the BTS
IDF	Intermediary Distribution Frame
LTE	Long Term Evolution – a 4G technology for wireless broadband expected to be released in 2009/10
MDF	Main Distribution Frame

RF	Radio Frequency
VoIP	Voice over Internet Protocol
WiMAX	Worldwide Interoperability for Microwave Access - A new 4G technology available starting 2008.
WSP	Wireless Service Provider (AT&T, Sprint, etc.)

2.6 Referenced Documents

The following table shows the documents upon which this document depends:

Name	Location
DAS Whitepaper 6/07	HTNG Web Site

3 Executive Summary

3.1 Overview

Guest demand for digital comfort in hotels is at an all time high. The guest room is now an extension of the home, work space and public place for many hotel guests. As such, they require all the amenities they have become accustomed to. Business travelers rely heavily on their cell phones and email data services. The wireless infrastructure in the hotel plays a key role in enabling these conveniences. A property that does not provide adequate wireless voice and data services to these business travelers puts their repeat business at risk. To that end, a Distributed Antenna System (DAS) is an enabling technology to allow multiple wireless communications technologies to coexist on one network in the hotel.

DAS solutions are used to enhance cellular signals in hotels and allow many existing and future technologies to be deployed to better leverage current capital and/or operating expense. The DAS should support a number of applications, including multiple cellular carriers and their associated frequencies (800 MHz, 900 MHz, 1900 MHz, etc), Public Safety, Wi-Fi, and WiMAX to name a few. The DAS provides filtering and amplification of RF signals so they may be distributed to the desired locations within a hotel. Pervasive in building coverage is critical as more applications become available on mobile devices to manage back of house communications and provide a better guest experience.

Specific to the hospitality industry, there are challenges of which hoteliers should be aware. A DAS can be expensive to deploy, therefore, a focus on ROI as well as harder to measure value to the guest and hotel operation should be considered. Capital is typically limited and is not always available at one time. Consideration should be given to releasing capital in stages for a series of projects rather than as a one time, lump sum. Hotel management may prefer to deploy a DAS using capital funds, while ownership may prefer to defer many costs to operating expense, such as a lease arrangement. Foresight in interacting with the wireless carriers and DAS vendors can create a solutions approach to deploying and funding the DAS for the hotelier. In many instances, carriers are willing to help pay for some of the DAS hardware and/ or installation in exchange for some commitment to purchase their services. Creativity in design, value of the overall project, and multiple cost models are important considerations for any hotelier to keep in mind.

In summary, there are a number of direct benefits a hotel may derive from deploying a DAS:

- Help overcome the limitations resulting from the implementation of green initiatives (i.e, LEED certification) which may limit the ability for RF to effectively penetrate and propagate into the building.
- Provides a foundation to support current and future wireless services and applications (corporate VPN, email, video surveillance, building automation, etc.) which benefit hotel guest and staff alike.
- May allow the property to remove active components (switches, access points, etc.) from public spaces and locate them in centralized, secure closets for ease of maintenance and technology upgrades.
- Enable first responder (police and fire) communications. The requirement for first responder radio coverage is becoming more prevalent as municipalities adhere to local

ordinances and adopt national codes. The result to the hotel is a safer environment for staff and guests in an emergency situation ranging in criticality from a 911 call/response to a major catastrophic event.

- Provide hotel staff with real time access to guest request information thereby minimizing staff response time and improving guest satisfaction
- DAS networks enable multiple wireless frequencies (400 MHz to 6 GHz) to run over a single, unified infrastructure, thus reducing cap/op-ex as new technologies are adopted.
- Reduce guest complaints regarding wireless coverage and potentially improve JD Powers and Associates' property rating.
- Improve the attractiveness of hotel to conference and trade show clients by providing effective cellular and mobile broadband coverage.

3.2 Use Cases

A corporate CEO flies across the country for a meeting with a key customer. The meetings are scheduled in one of the meeting rooms at a preferred hotel. The CEO checks voice mail before walking into the meeting and learns that some reports are being updated by his staff and will be forwarded to him just in time for the client meeting. The CEO assumes he will be able to download the data on his Blackberry and walk the customer through the financials in real time. Unfortunately, there is no cell/PCS connectivity in the meeting room and the CEO is forced to delay the meeting, causing him to lose credibility with the client.

A hotel customer disappointed with the cellular coverage on the property threatened to take his business' annual conference to a competitor if the property did not provide a specific mobile-phone service for its executives to stay in touch with key clients. The loss of this customer would have resulted in the hotel's losing millions of dollars in revenue over the span of one week each year for a minimum of 5 years.

The Hotel installed and tested the DAS in time for this client's annual conference and the client was so pleased with the performance of the new wireless services that the president and CEO of the Fortune 500 Company personally praised the hotel's wireless services. The coverage in the guest rooms, conference areas, and even poolside areas provided wireless mobility to the thousands attending the conference. Subsequently, the hotel upgraded the facilities to support all four major carriers and WLAN so that all other conference attendees and guests would have a pleasant and productive wireless mobility experience.

The DAS solution, which cost less than half of the revenue for this particular client's one-week conference, will now provide a high-quality wireless mobility experience for all of the hotel's clients for years to come. Since the WLAN can be controlled by the hotel, it provides an additional revenue source for services. As a result, this property minimized cost and gained the potential for new customers by implementing the converged Wireless DAS, providing reliable high-speed Internet access throughout the property. For this hotel, the return on investment (ROI) was less than one week.

Guest safety has always ranked at the top of the list of concerns for any hotel. One landmark property in Manhattan has been subject to bomb threats and safety scares and has taken precautions to alleviate these pressures. As a result, the hotel has been working with the local fire and police to ensure constant and consistent communications for these first

responders throughout the facility, including stairwells and elevator shafts. As such, the hotel made the decision to deploy a DAS system to provide public safety spectrum enhancement as well as to improve cellular connectivity for guests. In recent tests with the first responder groups, the hotel confirmed that its system fully propagates the appropriate public safety frequencies throughout the hotel footprint.

3.3 DAS Interfaces

The DAS will interface with carrier RF source(s) such as BTS, BDA, Femto Cell, etc. as well as with public safety systems and various WLAN access points to support third party applications such as VoIP. Generally, DAS vendors work with 3rd party equipment and applications vendors to test and certify their products to ensure proper operation on the DAS. Section 4 of this document provides guidelines for potential DAS interfaces.

4 Detailed Distributed Antenna System (DAS) Recommendations

4.1 Basic DAS Functionality and Elements

A DAS provides reliable wireless coverage inside buildings. Using a series of antennas located throughout the building, a DAS delivers wireless services to the end users. The wireless services provided by the DAS can vary greatly and will continually change over the lifetime of the building. When selecting a DAS, it is important to define the services the hotel will require today while also preparing for the future.

A DAS consists of two major elements - the signal source and the DAS infrastructure:

- Signal Source: Equipment to interface between the DAS and the wireless service provider (i.e. BTS, BDA, Femto Cell, AP, etc.).

- DAS Infrastructure: Coaxial cable, fiber, and RF components transport wireless signals from the signal source to the distributed antennas that broadcast (transmit and receive) the signals to the client's mobile devices.

A DAS operates at the radio frequency level only – it is essentially an antenna that transmits and receives the RF signals required of the applications that ride on it. Because an application can leverage a wide range of technologies and RF frequencies, you should know which technologies and frequencies a particular application requires to ensure it can be properly supported on the DAS.

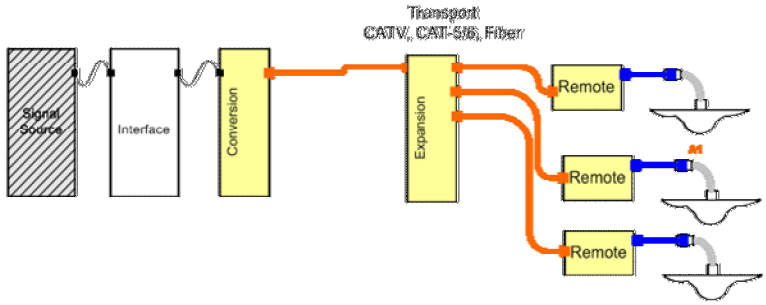
In addition, each signal must be received by the mobile device at a minimum power level to be effective. Low signal strength can result in application failure, such as a dropped cell call, a lost wireless network connection, etc. The DAS design must take into account these signal strength recommendations and provide wireless coverage at the appropriate power levels.

4.2 Technology Alternatives

There are three general categorize of DAS; Active, Passive, and Hybrid. These categories can be subdivided by whether the DAS supports a single-service or multi-services. Single-service DAS only supports one wireless technology over its infrastructure. Multi-service can support multiple wireless services over a single infrastructure, thus reducing deployment cost.

Active Systems

Active systems utilize a higher level of active (powered) components in the system and tend to be specific to one Wireless Service Provider (WSP) or limited grouping of WSPs. Typically; the RF signals are converted for transport through the building on a medium such as fiber or CAT5/6. To increase the number of remote amplifiers for larger buildings, the active DAS may use an expansion hub in the transport system as illustrated in the following diagram.

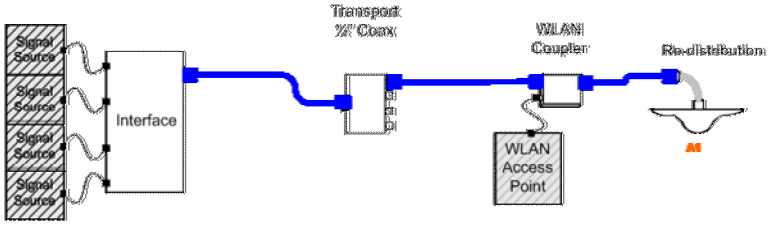


Active systems may have several expansion hubs feeding multiple remote hubs. Typically, each remote hub feeds only one antenna. These systems are generally used to improve cellular coverage for a single WSP and tend to be cost-optimized for single operator deployments. In instances where multiple services or operators are required, multiple "parallel" networks of active systems may be needed. For example, Verizon uses a spectrum in the 800 MHz band, often referred to as the cellular band. Nextel, now Sprint, also uses a spectrum in the 800 MHz band but it is referred to as the SMR (Specialized Mobile Radio) band. Combining these wireless service providers into a common antenna is difficult for a highly active DAS. In this case, there would need to be two complete systems, each with its own interface, conversion, transport, remotes, or expansion hubs and associated antennas.

WLAN deployment with an active system usually required a traditional approach; a parallel network with WLAN Access Points mounted in user areas. As discussed in subsequent sections, the overlay of WLAN in passive and hybrid systems can take advantage of the existing antenna since it's connected using broadband coax. The active system uses very little coax, so there is little or no opportunity to overlay the WLAN on the DAS.

Passive Systems

Passive systems consist primarily of half-inch and larger broadband coaxial cable. Passive devices, such as splitters or couplers, are used to distribute the RF signal to different areas of the building or coverage area. In a large facility, the passive DAS requires a full engineering design, due to installation/facility complexities.



Since the coaxial cable has broad bandwidth, it can accommodate a range of services operating at different frequencies. The interface equipment may combine RF signals from several services, all of which are re-distributed over a common antenna or radiating coax – this is the fundamental benefit of a passive system. The deficiency of the passive DAS is that the power of the RF signal input to a passive DAS needs to be 10 to 100 times stronger than in an active or hybrid DAS to compensate for losses that occur on the coaxial cable. This may increase the cost of the signal source the WSP has to provide, which, in turn, may inhibit participation by the WSPs and prevent them from coming on the system. The higher power

levels typically required to plug into this type of system exponentially increase the likelihood of interference and inter-modulation issues.

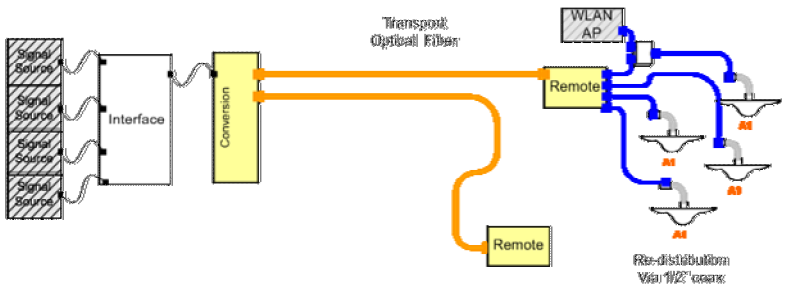
Integration of Wireless LAN over a passive system is achieved by passively coupling the output of a Wireless LAN access point onto the distribution coax. The WLAN services then share the antenna or radiating coax with the cellular services. This is done after the last splitter and within 50 to 150 feet of the antenna, as the losses in the splitter and coax diminish the WLAN performance. This approach allows the WLAN access points to be located in a more convenient location.

There are also methods by which multiple WLAN access points can be combined for service over a single antenna or a run of radiating coax. However, this requires that the WLAN deployment be engineered and fully provisioned to support advanced WLAN features. As always, any WLAN deployment other than the traditional approach described in section 2.2.1 Active Systems, should be discussed with the WLAN access point provider.

Hybrid Systems

Hybrid systems combine active and passive elements, typically using low-loss fiber optics in the “transport” part of the network and taking advantage of the broadband nature of coax for the “distribution” part of the network. Like an active system, the hybrid system uses a remote hub before connecting to multiple antennas for re-distribution. However, at this point, the active and hybrid system differ. The goal of the hybrid system is to leverage the best features of the passive and active systems into one solution.

The hybrid system does not use an expansion hub like the active system described earlier; rather the hybrid system uses a higher output power remote unit. From the remote hub, broadband coax is deployed to support multiple antennas. From each antenna, all wireless services can radiate simultaneously if the solution chosen has the required interference mitigation and is approved by all service providers. The remote hubs are typically installed in telecom closets or IDFs for easy access.



All DAS deployments should maximize the use of broadband components, such as antennas, splitter/combiners, etc., in order to provide for future services with minimal component replacement.

4.3 DAS Wireless Service Examples

The table below outlines common services, frequencies and minimum signal strengths for typical DAS deployments. It's important to define what wireless services the DAS should support.

Service	Common Technologies	Frequencies	Minimum Signal Strength	Common Names
Public safety/First responder communications*	SMR	150MHz 450MHz 700MHz 800MHz 900MHz	-95dBm	Fire Fighter & Police Radios
Cellular voice calls Cellular data applications Blackberry/PDA applications Instant voice messaging	AWS GSM CDMA UMTS/W-CDMA EDGE EVDO (Rev A) 1XRTT DECT	700MHz 800MHz 900MHz 1800MHz 1900MHz 2100MHz	-85dBm	Cell Phones PDAs Smart Phones
Push to talk (PTT) LMR	iDEN LMR	800MHz 900 MHz	-95dBm	Push to Talk
High-speed data, multi-media, video streaming	Mobile WiMAX LTE (future)	2.5 GHz (US) 700 MHz (US)	-75dBm	4G Mobile Data
Wireless LAN	802.11b/g 802.11a	2.4GHz 5-6 GHz	-75dBm	Wi-Fi
One-way, Two-way Paging	FLEX	900MHz	-75dBm	Pagers

When 802.11a/b/g/n networks are used on the DAS, it is important to recognize that certain applications may require stronger signal coverage as outlined below:

Service	Common Technologies	Frequencies	Minimum Signal Strength	Common Names
Voice over Wi-Fi	802.11a/b/g	2.4GHz 5.8GHz	-65dBm	VOIP
Location based services	802.11a/b/g	2.4GHz 5.8GHz	-65dBm	Asset Tracking

4.4 Signal Coverage and Reliability

Signal strength should be evaluated using a 50' x 50' (approximately 15m x 15m) grid measuring all propagated signals at every grid intersection. Signal strengths must meet or exceed the recommendations specified by each application the DAS is intended to support.

Minimum signal coverage should be 95% or better in the intended coverage areas to ensure reliable client device operation. Signal coverage should also be validated with a propagation map. The DAS shall operate 99.9% of the time over the signal coverage area, enabling high quality applications functionality. Up-time should be verified via remote monitoring.

Note that WSP provided signals are a consideration with respect to uptime of the entire system; the uptime of these signals is specific to the individual carrier and is not included in the uptime metrics cited above.

4.5 Manageability and Security

Centralized/Distributed Management is recommended for all DAS deployments and should provide end-to-end visibility. Common management technologies include CLI, SNMP, HTML, telnet, etc. Typical access interfaces are POTS, RF Modem, Ethernet, http, etc.

A quality DAS management system supports a layered security model utilizing existing standards for physical security, management system security, and user authentication. The table below reflects typical DAS deployments.

Service	Description
Centralized/distributed management	User can leverage single monitoring interface to track/maintain/configure all DAS components
Remote monitoring compatibility	User can access the monitoring function of the system without being required to connect directly to a DAS
Physical security	In public areas, system can be secured with a lockable enclosure to ensure physically security
User authentication	System supports different users having access to defined sets of system configuration and controls

4.6 Aesthetic Options

Each facility likely has its own aesthetic recommendations. These recommendations may include the following:

- Stealth antenna placement (e.g. above ceiling tile)
- Specific cable colors
- Painted antennas

It is up to the individual facility to identify the aesthetic recommendations necessary for the implementation.

4.7 Capacity, Scalability and Expandability

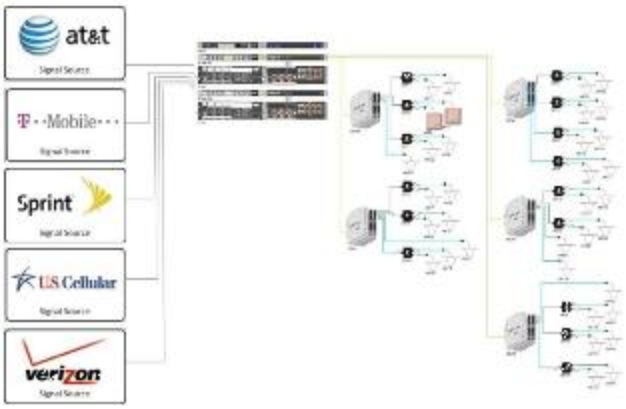
A DAS can be designed to support multiple buildings and services when the right DAS manufacture is provided. To ensure the best DAS selections, DAS should have a single head-

end where all wireless services are combined. The head-end should be scalable to support the addition of new services and expansions to new coverage areas.

4.8 Design Examples

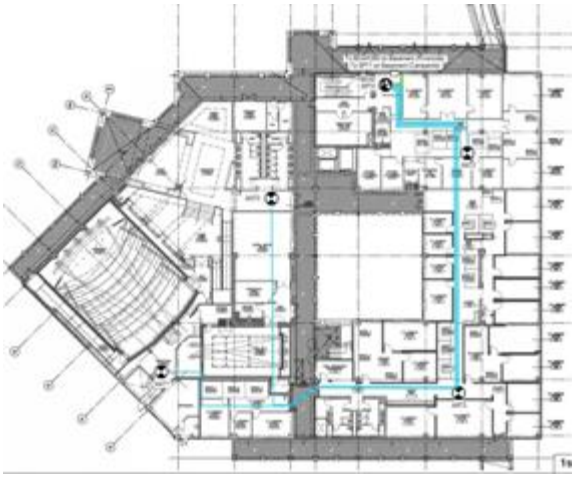
Hybrid Multi-Carrier DAS

The conceptual diagram below represents the DAS end to end. Carrier signals enter the DAS on the left of the diagram. The signals are combined at the head end (black box in middle) and converted to fiber optics for transport to the remote hubs. The remote hubs convert the optical signals back to RF for transport to the antennas on the right of the diagram.



Equipment Layouts

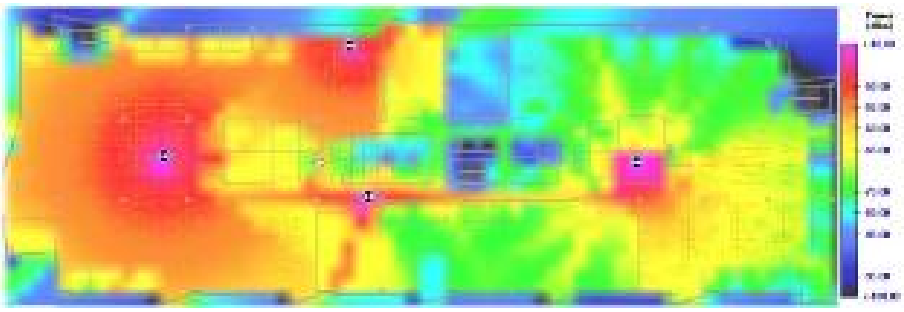
Antenna placement and cable layout example diagram.



Propagation Modeling

Using advanced RF modeling software a DAS can be tested and proven before the DAS is constructed. In the diagram below, the wireless antennas are propagating wireless signals in colors. The strong signals are in red (hot) and the poor signals are in blue or black (cold). In this example the entire floor will have strong wireless coverage.

Note: The software below takes into account the composition and placement of the interior walls. All interior walls will affect wireless coverage.



5 Implementation Recommendations

The following section outlines implementation recommendations to support the design, implementation, and ongoing maintenance associated with the DAS solution as recommended in Section 4 above.

5.1 Project Scope

5.1.1 Implementation Services

A DAS Vendor should be capable of providing turnkey services in support of a wireless broadband DAS solution to include the following. Actual project scope will be venue dependent and could cover a multitude of wireless applications as referenced in Section 4.3 above.

RECOMMENDATION

Site Survey
Vendor should submit site survey report of similar size and scope project

Design/Engineering
Vendor should submit design/engineering plan of similar size and scope project

Project Management
Vendor should submit project management plan for similar size and scope project

Staging

Cable Plant Installation

Cable Plant Certification
Vendor should submit cable plant certification report.

Equipment Installation

Test/Turn-up

Carrier Activation

Tuning

Solution “as-builts”
Vendor should submit sample “as built” report

Lifecycle Maintenance

Vendor should possess “like” past performance qualifications in similar size/scope hospitality venues

Vendor should submit at least three (3) references and associated POC's for verification. Project should be of similar size and scope.

5.1.2 Installation

RECOMMENDATION

All installation services (direct or via subcontractors) should be under the control of the vendor acting as the prime contractor

If Vendor employing subcontractors for project, vendor should submit three (3) references and qualifications of subcontractors for similar sized projects

Where applicable, compliance to all local laws and permitting requirements must be maintained and demonstrated upon demand.

5.2 Provisioning

5.2.1 Equipment and Software

Vender should provide each of the following components necessary to render a fully operational and compliant DAS per design criteria established by the hospitality venue. Incremental functional items such as radio sources, APs, client devices, and/or software applications may or may not be provided by the vendor and is venue dependent.

RECOMMENDATION

Equipment

Software

Cabling

Connectors

All equipment should be recognized and approved by all major wireless service providers

All equipment must meet or exceed all necessary certifications to include, but not limited to: UL, FCC, IEEE, etc.

Vendor should provide references and/or information from all appropriate wireless service providers indicating equipment approval.

5.2.2 Design Plans and Supporting Documentation

Vendor should render a design plan and all supporting documentation which highlights, at a minimum, the following information:

RECOMMENDATION

Wireless application recommendations (provided by the customer or recommended based on the site survey(s)).

Antenna locations

Propagation plots based upon desired wireless application support (as required by hospitality venue)

Designated equipment locations

Powering requirements

Typical hardware mounting/layout diagrams

Vendor, subcontractor, hospitality venue roles/responsibilities

Cable plant design (vertical/horizontal)

Design should centralize all managed electronics at the head-end or in appropriate IDFs and closets to allow greatest access for telecommunications and IT managers as well as maximum physical security for the equipment

Cable plan certification criteria

Detailed equipment specification as determined by hospitality venue but shall include, at a minimum, equipment environmentals such as space, power, operating temperatures, heat dissipation

Detail locations of Active and/or Passive components

Wireless Service Provider considerations should be met and outlined.

Consideration for any e911 initiatives by wireless service providers should be incorporated into design.

Documented test measurement data from site survey in sufficient detail to establish current coverage challenges both horizontally and vertically across the facility. Sufficient cross section data of the property should be measured and documented to establish Acceptance Test Criteria for implementation

5.2.3 Acceptance Test Specifications

Scope Change Procedure (major and minor)

RECOMMENDATION

Vendor should possess documented procedures/processes which define, in sufficient detail, application scope change procedures.
Vendor should submit a standard change control document for review, including sign off requirements.

Any/all technical, business, and scheduling impacts to such scope changes should be clearly identified and documented in sufficient detail for review/approval by all hospitality management stakeholders.

Change Order sign-off sheet should be completed prior to undertaking any work associated with scope change.
Vendor should submit a standard change control document for review which includes sign off requirements.

5.3 Project Team (Meeting & Reporting)

5.3.1 Staffing and Subcontracting

RECOMMENDATION

Prior to commencement of any project, vendor should document and distribute project organizational charts which detail all appropriate project stakeholders and their associated roles and responsibilities on the project.

All other general contractor, hotel management, ownership management, cabling contractors, low voltage contractors, etc. associated with the project should be clearly identified.

Vendor should adhere and state compliance to standard hotel security procedures, dress code, code of conduct, etc.

Vendor should comply with all facility security access procedures which may include contractor/subcontractor badging.

Documentation should include complete contact information for each key project stakeholder.

5.3.2 Project Management & Weekly Team Meetings

RECOMMENDATIONS

Whether project is a new build retrofit, or renovation project, Project Manager should establish, maintain and manage a project plan (MS Projects recommended but not required) which addresses all project tasks, task owners, planned start/completion dates, actual completion dates, etc. Plan should possess input from all key project stakeholders identified for the project.
Vendor should submit sample project management plan for similar size and scope project for review .

Weekly team meetings (or as determined by project stakeholders) should be scheduled and hosted by the Project Manager with all appropriate stakeholders in attendance (or represented by competent persons from their respective departments).

Meeting minutes and action items should be distributed and maintained by the

Project Manager

5.4 Facilities Recommendations

5.4.1 Work Rules

RECOMMENDATION

Project Manager will establish, document, distribute, and ensure adherence to all work locations rules and regulations. This can include, but is not limited to: building access requirements, badging, safety requirements, safety training, hours of operations, dress code, code of conduct, etc. (in concert with the hospitality venue management staff and ownership group).

5.4.2 Building Conditions

RECOMMENDATION

Prior to commencement of any work on site, Project Manager is responsible for reviewing building conditions to determine feasibility of project, identifying and documenting any obvious hazardous building conditions, and noting any other considerations that may impact success of project, work schedule, or safety of any workers. To the degree feasible, any deficiencies will be duly noted to the hospitality venue management to ensure all noted issues are addressed prior to work commencement.

5.5 Project Acceptance

5.5.1 Acceptance Testing Responsibility

RECOMMENDATION

A designated vendor team consisting of the Project Manager, cabling contractor (if applicable), and appropriate hospitality venue designated representative should be responsible for performing and completing signoff of

the acceptance test plan (ATP).

5.5.2 Testing Process

RECOMMENDATION

Acceptance testing usually consists of injecting a signal (from a test transmitter or other radio source specific to the targeted wireless application) into the DAS and measuring the level of the signal at several areas in the property. A proposed and acceptable method of testing should be submitted with the vendor's original design meeting all key application criteria established by the hospitality venue.

The acceptance test criteria should match the original site survey criteria in conjunction with the wireless applications as established in Section 4.4 – Signal Coverage and Reliability referenced above.

5.6 Installation

Hospitality venues are unique with regard to DAS installation as they do not have down-time like public venues, airports, or convention centers. Access may be a challenge, and installation may be restricted due to hotel occupancy or security issues. Active DAS networks may require occasional maintenance so future access considerations need to be addressed during the design and implementation phases. Additionally, the wireless service providers require access to install and commission their radio sources and for performing ongoing maintenance as may be outlined in any contract established between each wireless service provider and the building ownership group. Most vendors take this into consideration, but restricted access should be specified as early as possible in the project and include times that certain areas will be available for installation. While most DAS infrastructures require only a few workers to deploy, consideration should be given to access for these workers and the typical access restrictions unique to hotels.

5.6.1 Building Access

RECOMMENDATION

Ability to do night work is required and may be the best option for common areas, but not guest rooms.
Vendor should submit a sample written plan for restricted access.

5.6.2 Training

RECOMMENDATION

On-the-job training should be provided by Vendor
Sample written plan for training should be included.

5.6.3 Damage

Vendor should procure and maintain throughout project the following insurance coverage through insurers who carry an AM Best Rating of at least “A-,“ “VII” or comparable rating from a recognized insurance rating agency. Actual coverage levels listed below are suggested and would be determined by the hospitality venue based upon project size and scope.

RECOMMENDATION

Worker’s compensation insurance including employer’s liability that complies with the applicable workers’ compensation laws governing vendor and all employees working for hotel.

Comprehensive general liability insurance including contractual liability and liability for bodily injury or property damage, with a combined single limit of not less than $2,000,000 for each occurrence or as otherwise determined by the hospitality venue. Insurance should name hospitality venue as an additional insured.

Automobile liability insurance including all owned, non-owned, and hired vehicles in conjunction with this project for bodily injury or property damage with a combined single limit of not less than $1,000,000 each occurrence or as otherwise determined by the hospitality venue.

Vendor should deliver certificates of insurance and any renewals thereof to hospitality venue, which evidences the required coverage.

5.6.4 Warranty

RECOMMENDAITON

In addition to any third party warranties that vendor possesses for the Equipment, vendor should warranty, for a minimum of one (1) year from the date of the acceptance (but no more than three (3) months after commissioning and issuing a Ready for Use (RFU) certificate) the system, that any and all such Equipment incorporated into the System shall be new, free from defects in material, workmanship and design, shall conform to any and all applicable specifications, drawings, samples, and shall be suitable for the purpose for which intended.
Vendor, at its sole cost and expense, should replace or repair all Equipment failing to comply with the manufacturer’s warranty set forth in manufacturer’s warranty statement.

Any replacement or repaired Equipment should be warranted to be free from defects in material and workmanship under normal use for ninety (90) days from the date of delivery or the remainder of the original warranty, whichever is longer.

The warranty should clearly identify the hardware, software, and other miscellaneous components that are covered under the warranty definition. Warranty should clearly identify service levels and responsibilities of each party related to warranty services.

5.6.5 Ongoing Maintenance

RECOMMENDATION

Vendor should be responsible for providing all warranty and post warranty maintenance on the installed solution.

Vendor should offer the hospitality venue various levels of service plans to protect the customer's investment in the Distributed Antenna System (DAS) solution.

Vendor should submit Service Plan options for Certification

Depending on the service contracted by hospitality venue, the maintenance services to be included under an ongoing maintenance plan may include the following:

5.6.6 Call Center / Help Desk Function

RECOMMENDATION

A telephone number should be provided to either speak with a qualified vendor representative or log a trouble ticket. Level of service is commensurate with associated service level as defined in the maintenance agreement between hospitality venue and vendor.

Remote access to the system (Dial up or telnet) should be utilized to invoke remote troubleshooting of the reported problem and, if necessary, dispatch a technician on-site to expedite resolution (if necessary and per service plan terms and conditions). Vendor's remote access to Equipment should be governed by the terms of remote access procedures and regulations established by the hospitality venue.

Problem escalation procedures and timelines should be clearly identified through final resolution.
Software/Hardware bug and resolution report should be provided.

5.6.7 Dispatch

RECOMMENDATION

Vendor should be responsible for providing all warranty and post warranty maintenance on the installed solution.

Vendor should offer the hospitality venue various levels of service plans to protect the customer's investment in the Distributed Antenna System (DAS) solution.

Technician should be dispatched on-site once the trouble ticket has been opened thru the Call Center and the assigned engineer has completed troubleshooting and diagnosis of the problem (if necessary and per service plan terms and conditions).

Technician should be dispatched on-site to replace the component that has been diagnosed to cause the problem and expedite continued and satisfactory operations (if necessary and per service plan terms and conditions.

Technician should be dispatched on-site once the trouble ticket has been opened thru the Call Center and the assigned engineer has completed troubleshooting and diagnosis of the problem (if necessary and per service plan terms and conditions).

Technician should be dispatched on-site to replace the component that has been diagnosed to cause the problem and expedite continued and satisfactory operations (if necessary and per service plan terms and conditions)

5.6.8 Spare Parts, Warehouse/Consignment

RECOMMENDATION

Should include the planning, receiving, warehousing, and consigned inventory management of spare units.

Spare units should be warehoused on the customer's site or in a central location depending on the service level agreement negotiated within the Maintenance and Support contract.

A replacement unit should be sent with the dispatch technician when he/she goes on-site to replace a component and resume operations (service level dependent).

Feedback:

Please visit http://www.surveymonkey.com/s/HTNG_HotelDASRefDocSurvey to complete a short survey regarding this document.