Appendix C
Distributed Antenna System for San Francisco International Airport
Technical Requirements

1. Overview

The San Francisco International Airport ("SFO") is requesting proposals from qualified firms for the design, procurement, installation, operation and maintenance of a state-of-the-art centralized, neutrally-hosted, modular, expandable Distributed Antenna System ("DAS"), capable of providing robust coverage and capacity for the following services throughout the Airport complex:

- Commercial cellular services considering all the frequencies currently used by cellular-service providers, as well as frequencies that are expected to be used in the future;
- Other current and emerging commercial Radio-Frequency ("RF") based services;
- Enhanced RF-based voice and data communications related to airport operations.

SFO’s objective is to have a centralized system providing these RF-based applications throughout all the Airport facilities (see the site plan of the entire Airport complex presented in Appendix A). SFO reserves the right to reach this objective in phases. If the Airport in fact pursues the project in different phases, the initial stage will focus on a system covering all or some of the following areas: 1) the corridor along the western side of the Airport campus adjacent to Highway 101, and 2) the existing public passenger areas (domestic and international terminals, parking garages and rental car facilities). Subsequent phases will include other facilities within the Airport perimeter.

SFO seeks qualified firms that can: 1) provide a solution for all the facilities within the Airport perimeter; and, 2) proceed immediately with implementation of the DAS.

The Airport invites interested vendors to submit proposals for the following two components of the project: 1) The first component involves design, fabrication and installation of a comprehensive DAS throughout the entire Airport complex (see the site plan in Appendix A); 2) The second component involves operation, maintenance and support services for the DAS once the system becomes operational, for an initial period of three (3) years, with an option to extend these services for three (3) additional years.

Proposals must address the two components of the project indicated above. A single contract will be awarded for both components. Proposers may enter into a partnership, joint venture or other prime contracting arrangement to carry out either one (or both) of these components of the scope of work. The proposal must identify the names and relationships of all corporations, partnerships, joint ventures, subcontractors and affiliates of proposer to provide the goods and services specified in this RFP.

The following diagram presents a visual representation of what SFO desires to accomplish with this RFP.
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All RF Devices
Cellular Carriers A, B, C, et al Phones, PDAs, etc. Satellite Radio Vendors 1, 2, etc., Airport Maintenance Radios, Airline Maintenance Radios, Passenger Wi-Fi Devices, WiMax devices, Satellite TV, Over-the-Air HDTV, Public Safety radios, etc.

Airport

Passenger

Tenant

Airline
- Police (SFPD, San Mateo County mutual aid)
- Fire (SFFD, San Mateo County mutual aid)
- Federal Agencies (TSA, CPBD, FIS –Federal Inspection Agencies, FBI, Federal Anti-terrorism Response team, etc.)

(R Licensed / Unlicensed)

RF spectrum
(Air Medium)

Campus-wide SFO RF DAS Infrastructure
(Licensed / Unlicensed)

SFO DAS Application-specific Component Interface Layer

Application-specific Provider Base Station(s)

Providers: Cell carriers, satellite TV / radio vendors, etc.

SFO Circuit & TCP/IP Network

Internet / Provider Networks

The figure above illustrates the conceptual framework of the SFO DAS, as follows:

- Reading from top to bottom, any number of RF devices will be supported by the DAS over its expected life (15–20 years). The devices will include handheld mobile phones and PDAs, fixed digital televisions, satellite radios, maintenance radios and the like.
- All the devices will have the common aspect of using some form of RF technology and will pass through the Air Medium.
- The campus wide SFO RF DAS Infrastructure will be made up of a variety of antenna structures to support the devices currently in use plus those anticipated to be coming online over the life of the system. Support will be provided for both licensed and non-licensed RF applications.
- The Application-specific Provider Component Interface Layer provides a consistent, published technical interface for any vendor to connect and use the SFO DAS.
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- The Application-specific Provider Base Station(s) is a generic term that identifies the proprietary vendor backend equipment required for that vendor to establish and maintain service over the SFO DAS. This equipment is provided by the vendor of the application and maintained by that vendor.
- Finally, the SFO circuit and IP networks are used to gain access to the Internet and the application-specific vendor and/or provider networks.

The successful proposer will provide both the RF DAS Infrastructure and the Application-Specific Component Interface Layer based on the technical requirements contained in this RFP. The resulting solution shall enable any application provider to provide its service over the Airport’s DAS.

2. Definitions

The following are definitions used throughout this document:

- Owner – The San Francisco International Airport Commission (“SFO”), an Agency of the City and County of San Francisco (“CCSF”), California, U.S.A.
- Proposer – A firm responding to this RFP and submitting a proposal for: 1) the design, fabrication and installation of the DAS at SFO; and, 2) operation, maintenance and support services for the DAS, as outlined in the RFP. The references made to Proposer within this RFP generally correspond to items that the Proposer shall include in its answers to the RFP.
- Contractor – A qualified firm that Owner selects through this RFP process to: 1) design, fabricate and install the DAS; and, 2) operate, maintain and support the DAS for the term specified in the Professional Services Agreement to be executed between the Owner and the Contractor (currently it is anticipated that such term will be 3 years after Owner’s acceptance of the DAS, with an option to extend for 3 additional years).
- Operator – Refers to the Contractor in its capacity of provider of operation, maintenance and support services for the DAS, after the system is operational.
- Base System – A DAS solution that supports one (1) or more cellular carriers. The DAS shall be capable of supporting multiple cellular carriers and other applications, in addition to the Base System, as explained in this RFP.
- Open Architecture – A quality of the design that allows for key components of the DAS to be bid by more than one vendor. The net effect of an open architecture is a flexible system that can be easily expanded and maintained, to allow for competitive pricing to reduce the total cost of ownership over the life of the DAS.
3. **DAS Objectives**

The Airport wishes to achieve the following objectives:

- Establish reliable and seamless RF-based communications coverage through the creation of a common, non-discriminatory, comprehensive communications access system using state-of-the-art technology within the airport premises.
- Enable equal access to a common antenna system for all RF-based service providers.
- Provide comprehensive RF-based coverage for use by Airport operations, airline operations, tenant and concessionaire operations, and passengers.
- Accommodate the current technological and capacity requirements for wireless connectivity, with the ability to add capacity and support for emerging technologies as the need arises.
- Provide an efficient administrative and reporting interface to the Airport.

4. **General Considerations**

SFO seeks to implement a common distributed antenna system which satisfies all of the technical requirements, as specified in this RFP, and can be easily upgraded and expanded to satisfy future needs.

The DAS shall adequately support the requirements of the cellular service providers currently operating at SFO, as well as other cellular companies that might operate at the Airport in the future. As outlined in this RFP, the Contractor shall design, procure and install the DAS, and shall verify that it works properly, meeting all the operational requirements outlined in the design specifications developed during the design phase of the system. To confirm that the DAS operates as required, the Contractor shall conduct verification testing based upon acceptance criteria defined in the technical specifications that will be developed during the design phase. All the equipment and systems needed to conduct the verification testing shall be provided by the Contractor.

The San Francisco Airport shall be the sole owner of the DAS after accepting the system.

5. **Project Technical Requirements**

5.1 **General Requirements**

The general requirements related to the DAS project are presented below:

5.1.1 Contractor shall design a protocol-neutral solution to support RF-based telecommunication applications throughout the San Francisco International Airport campus, including both airside (outside gate and ramp areas) and landside (passenger terminals, concourses, airport offices, etc.) facilities. Refer to the site plan and drawings presented in Appendix A of this RFP for diagrams of the facilities. Within this signal coverage area, all technical requirements shall be met.
5.1.2 Contractor shall procure, install and test the Base System of the DAS for the SFO campus. The Base System shall support all identified cellular carriers at design acceptance by SFO. The Base System shall have the capability to cost-effectively interface with additional cellular carriers and other RF applications.

5.1.3 Contractor shall provide all components, equipment, supplies, tools and labor required to design, procure, install and test the DAS, except where noted in this RFP.

5.1.4 Contractor shall operate and maintain the DAS after the system becomes operational and is accepted by the Airport. Operator shall: provide all components, equipment, supplies, tools and labor required to operate and maintain the DAS; conduct all repairs and maintenance of the system to keep it in proper working condition, in accordance with the performance specifications; install all software updates; prepare reports related to performance levels and usage; and, install additional components or consumables as required to maintain the system operating properly in accordance with its performance specifications.

5.2 Application Requirements

This section describes the key requirements related to the DAS applications.

5.2.1 Multiple Cellular Carriers: The DAS shall provide support for multiple cellular carriers, including all spectrums that cellular carriers are currently authorized by the FCC to implement, as well as spectrum that will likely be implemented for cellular service in the near future. The cellular carriers currently operating at the airport include AT&T Wireless, Verizon Wireless, Sprint-Nextel and T-Mobile. The DAS must meet or exceed the requirements of these cellular carriers and others that may provide cellular service at the Airport in the future.

5.2.2 Public Safety Services: The DAS shall provide support for public safety services (4.9GHz and 700/800MHz) and shall support distribution of all public safety signals.

5.2.3 Paging Services: The DAS shall support distribution of 900 MHz paging services for airport staff, airline operations and passengers.

5.2.4 Wi-Fi: In the future, the Owner may elect to include Wi-Fi traffic on the DAS to satisfy the needs of airport staff, airline operations and passengers. For this purpose, the DAS shall support distribution of all 802.11 protocols based on 802.11a, 802.11b, 802.11g, and 802.11n versions. Currently, SFO has two years remaining on a concession with T-Mobile USA, Inc. (T-Mobile Hotspot) to manage and maintain a public Wi-Fi at the Airport. The existing Wi-Fi infrastructure will become the property of SFO at the end of the current lease (February 2010).

5.2.5 WiMAX: The airport may eventually deploy WiMAX. For this purpose, the DAS shall support distribution of current and future WiMAX signals.
5.2.6 Satellite Radio: Satellite radio providers may be interested in deploying satellite radio services inside airport facilities. For this purpose, the DAS shall support the delivery of satellite radio signals.

5.2.7 Over-the-Air HDTV: The DAS shall support the delivery of local San Francisco Bay Area over-the-air HDTV signals.

5.2.8 Fee-based Satellite Services: The DAS shall support the delivery of fee-based satellite TV and HDTV signals.

5.2.9 Ku band Satellite: The DAS shall support the delivery of Ku band satellite signals for disaster recovery communications in the event the airport’s regular telecommunications grid is rendered inoperative.

5.2.10 Aircraft Communications: The DAS will not be required to support communications among aircraft and/or FAA traffic controllers. However, the DAS shall not interfere in any way with such communications. The proposer shall review all applicable FAA regulations dealing with approved and restricted wireless communications in the vicinity of commercial airports to ensure that the DAS meets all applicable requirements.

5.2.11 Location Based Services: The DAS shall provide location-based services (“LBS”) that identify the location of user devices, with the minimum location accuracy being within the signal coverage area of a typical DAS antenna. The DAS shall be capable of providing this location information to various types of applications, such as airport public safety and vendor advertising systems. Some application-specific providers have their own LBS solutions (TruePosition, etc.); the DAS cannot interfere with existing, common LBS solutions in the marketplace.

5.2.12 Emergency 911 Services: The system shall support e911 and 911 location services.

5.3 System Architecture Requirements

This section describes system architecture requirements.

5.3.1 General Architecture: The DAS shall satisfy the following general architecture requirements:

- The DAS shall be designed and built with an open architecture. SFO will evaluate the “openness” of any architecture by its ability to: 1) allow the coverage of the SFO DAS to be extended rapidly and cost-effectively; 2) allow new RF applications to be added rapidly and cost-effectively; 3) allow the expansion or contraction of application-specific providers rapidly and cost-effectively; and, 4) allow SFO to easily ascertain the total cost of ownership and keep the cost of maintenance to a minimum.
- The system shall be capable of supporting and managing all the applications identified in this RFP.
- The system shall be designed and built with the ability to accommodate evolving technologies. The DAS must be efficient and cost-effective to upgrade as technologies and systems evolve. The DAS should be application-agnostic and not require any major changes to support additional RF applications.
5.3.2 Signal Coverage: The DAS shall satisfy the following signal coverage requirements:
• Signal coverage of 95% or better in public and non-public areas inside the airport terminals, adjacent garages and other buildings, and within 300 feet outside of these facilities. Refer to the site plan and drawings presented in Appendix A for a depiction of these facilities.
• Minimum signal penetration are as follows (assume 1900 MHz operation):
  o -85 dBm indoors throughout 95% of the anticipated coverage area;
  o -95 dBm outdoors throughout 90% of the anticipated coverage area.

5.3.3 Reliability: The DAS shall satisfy the following reliability requirements:
• Fault tolerance mechanisms to mitigate and/or eliminate single points of failure for all components of the system. The DAS shall have self-healing features so that none of the applications is disrupted.
• Service level of 99.99 percent or better for all applications.

5.3.4 Interoperability: The DAS shall provide interoperability among various public safety applications (e.g., 4.9 GHz and 700/800 MHz). The DAS shall have the capability to allow seamless interfacing and roaming among various public safety applications.

5.3.5 Backup Power: The DAS shall satisfy the following backup power requirements:
• Capability of connecting to a backup power generator to be provided by the airport. This is necessary if electrical power is lost to the airport.
• Battery and/or solar power backup for all network equipment. Such back up shall be sufficient to ensure continuous operation at full power and functionality for a period of not less than six (6) hours in the absence of utility power.

5.3.6 Non-Interference with Airport Systems: The DAS shall not degrade the operation of any other wireless system at the airport. Specifically, the installed DAS shall not interfere with FAA operations and equipment, nor with any other existing RF systems within the airport premises, including but not limited to public safety radio systems and other airport operational systems.

5.3.7 Conformance with State and Local Codes: The DAS shall conform with all FCC, FAA, OSHA and state/local codes. Conformance shall be the responsibility of the Contractor and not the Owner.

5.3.8 Type of Antennae in the System: The antennas to be installed throughout the Airport as part of the proposed DAS shall be low-profile, flush-mounted, multi-band. They shall be resistant to vandalism, accidental physical abuse or extreme weather conditions (wind, precipitation, etc.)

5.4. Design Service Requirements

This section describes the key requirements related to the DAS design services

5.4.1 The Contractor shall develop an overall architecture which includes all the network equipment, hardware, software and other components required to meet the requirements
defined in this RFP. The DAS design shall satisfy the requirements of all the applications identified in this RFP.

5.4.2 The Contractor shall convene project meetings and invite cellular carriers and other wireless industry operators to participate, contribute industry recommendations and offer concurrence with the technical, operating and business development of the DAS project. Attendance by the wireless industry operators will be voluntary. The Airport will encourage the cellular service providers to elect a lead spokesperson to serve as the prime contact with the DAS Contractor and the airport during the design, installation and implementation stages of the project. However, this cannot be guaranteed by the Airport and the proposer should articulate how it would proceed in the event that the cellular carriers do not participate in the project meetings.

5.4.3 The Contractor shall provide a detailed design, which takes into account the unique layout and structure of the San Francisco Airport. This includes identification of the antenna installation points and hardware.

5.4.4 The Contractor shall complete a detailed RF survey of the required coverage areas to make a determination of planned equipment locations, antenna placement and cable routing needed to design the DAS.

5.4.5 The Contractor shall have written acceptance of the design by the Owner prior to proceeding with installation.

5.5 Contractor Requirements Regarding Installation Services

The Contractor shall meet the following requirements regarding installation services:

5.5.1 Contractor shall designate an installation manager. The installation manager shall be located at an office in the San Francisco Bay area and shall be available to meet with the airport’s DAS project manager on a daily basis throughout the DAS installation. The installation manager shall be responsible for the overall implementation of the DAS and will be the single point of contact with the Owner during system implementation.

5.5.2 Contractor shall provide all the installation services necessary to install, configure and test all components of the DAS.

5.5.3 Contractor shall develop and provide a safety plan detailing precautionary measures taken to mitigate risks during installation. This plan must be fully compliant with OSHA regulations and Owner polices. The Owner will review and approve the safety plan before the Contractor can begin installation.

5.5.4 Contractor shall coordinate all applicable installation activities with the Owner as agreed upon in the approved installation plan. The Owner will identify a person with whom the Contractor will interface regarding installation activities.

5.5.5 Contractor shall conduct a survey of the facilities prior to installation of the DAS to determine cable pathways, antenna locations and the sites for all other required equipment. An initial survey may have been completed prior to the Proposer submitting
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its proposal, but the survey may have to be completed again prior to installation, in order to identify changes to the airport facilities and accommodate the DAS equipment and antenna sites accordingly.

5.5.6 Contractor shall install any required cabling throughout the airport facility within cable trays or conduits. The Contractor shall follow industry-accepted practices when installing the DAS. All cabling within cable trays and communications rooms shall be properly bundled with tie wraps or cable ties.

5.5.7 Contractor shall install the indoor antennas on suspended ceilings whenever possible. The Contractor shall receive approval from the Owner about the proposed antenna locations, especially when it is not possible or practical to install them on suspended ceilings.

5.5.8 Antennas shall be installed using brackets and jumper cabling approved by the Owner. Tie wraps and wire will not be acceptable as cable hanging devices.

5.5.9 All outdoor-mounted equipment shall be designed to support ambient temperatures ranging between 0°F and +122°F. The Contractor shall include vendor-supplied equipment specifications confirming that this requirement is satisfied.

5.5.10 All outdoor-mounted equipment shall be designed to withstand sustained winds up to 85 mph and gusts to 105 mph. Contractor shall provide detailed information regarding its proposed solution’s ability to tolerate wind loads and gusts, including any information from tests conducted to measure wind tolerance.

5.5.11 The system shall include protection against power surges, including lightning strikes, for all electrical and network connections. The Contractor shall provide all applicable equipment to satisfy this requirement.

5.5.12 The system shall incorporate proper grounding using standard industry practices. The Contractor shall document all grounding practices in the final as-installed documentation.

5.5.13 Contractor shall supply and install all cable trays beyond what is currently available within the airport. The Contractor shall receive approval from the owner prior to installing any additional cable trays.

5.5.14 Contractor shall provide all equipment cabinets. The Contractor shall utilize cabinets that are lockable.

5.5.15 Contractor shall explain any physical changes that must be made to the airport facilities to accommodate the installation of the system. This includes cutting into or through any part of the building structures, such as girders, beams, concrete, floors, partitions or ceilings. The Contractor shall obtain written permission from the Owner prior to making these types of physical changes to the facilities.

5.5.16 All components shall be installed according to the manufacturer’s instructions, unless the Owner authorizes deviations from those instructions. The airport may request that the Contractor provide manufacturer installation instructions for the airport to review.
5.5.17 Contractor shall coordinate with the Owner regarding dates and times that the Contractor will be actively installing DAS components onsite at the airport.

5.5.18 Contractor shall ensure that all public areas remain clear or are properly marked during installation. If installation activities are disruptive to airport customers or obstruct the normal flow of passengers, these activities shall be completed during off-hours, typically between the hours of 9 p.m. and 6 a.m. PST. The Contractor shall coordinate specific off-hour installation times with the Owner before proceeding with installation.

5.5.19 Equipment and supplies shall be stored only in areas authorized by the Owner. Based upon requests made in the answer to this RFP, the airport will identify areas where the Contractor can store equipment and supplies. Proposer is responsible for ownership of all equipment and supplies until the Owner accepts the DAS.

5.5.20 Contractor shall provide detailed descriptions of all the required equipment rooms. These descriptions must include requirements for power, HVAC, UPS, connectivity, physical size, internal racking and cage configurations, and any other items germane to the DAS equipment room(s).

5.5.21 Contractor shall provide installation status reports to the Owner on at least a weekly basis. The Contractor shall identify progress made with installation of the DAS, known risks, planned risk resolution, schedule impacts and any other pertinent information necessary for the Owner to effectively manage the deployment of the DAS. Based on the stage of deployment, the Owner may elect to have status meetings more or less often, depending on the stage of the deployment and progress being made by the Contractor.

5.5.22 Contractor shall provide as-installed documentation in sufficient detail to enable efficient and effective operational support of the DAS. The Contractor shall supply documentation that describes the actual installation location of antennas, cable runs, grounding practices, configurations, and any other pertinent elements that describe the installed system.

5.5.23 The ramp-up and activation of all services defined as requirements in the RFP, to include but not be limited to customer service, technical support, hosting, Operational Support Systems (OSS), network management systems, processes and personnel.

5.5.24 During the first twelve (12) months from the date that the Owner accepts the system, the Contractor in charge of design and installation of the DAS shall repair and/or replace at no additional cost to the Owner any failures or malfunctions resulting from normal use.

5.6 Verification Testing and Acceptance Requirements

This section describes verification testing and acceptance requirements. The DAS shall pass all verification test plan requirements prior to the Owner accepting delivery of the DAS. If the Contractor fails to satisfy all requirements, the applicable requirements must be met within 60 days. Corrective actions to the DAS may require additional verification testing to ensure that requirements have been met.

The Contractor shall provide the following regarding verification testing and acceptance:
5.6.1 Detailed verification test plan that shall be approved by the Owner prior to installation. This test plan shall address acceptance criteria agreed upon by the Owner and cellular carriers participating in the deployment.

5.6.2 All hardware, software, and personnel necessary to execute the verification testing.

5.6.3 All equipment and tools necessary to perform verification testing.

5.6.4 Performance of verification testing under observation of the Owner.

5.7 **Ongoing Operational Support and Maintenance Service Requirements**

The Operator shall consider the following regarding operational support and maintenance services for the DAS:

5.7.1 Operator should present a solution for an Operations Support System (OSS) that integrates all customer service, technical support, provisioning, network element and network management components as seamlessly as possible.

5.7.2 The required on-going maintenance services for the DAS shall include all support except level 1 help desk support functions. Tenants of the DAS will provide their own level 1 help desk support. The Operator shall provide remote and onsite troubleshooting, repair, preventative maintenance, and other support functions as needed to maintain required service levels.

5.7.3 Unless otherwise approved in writing by the applicable cellular carriers, Operator shall schedule all maintenance/repair which may result in service interruption only between the hours of 12:30 a.m. and 6:00 a.m. local time (PST).

5.7.4 Operational support shall be provided twenty-four (24) hours per day, seven (7) days per week, three-hundred sixty five (365) days per year.

5.7.5 Operator shall conduct routine monitoring of the DAS to ensure that it continues to offer a level of service consistent with the performance specifications, and as demonstrated during the acceptance / verification testing.

5.7.6 Operator shall provide support for event notifications and group management of system components. The Owner and selected application service providers must be capable of receiving specific event notifications based on priority of events.

5.7.7 Operator shall implement a built-in configuration database with ability to drill-down to system components.

5.7.8 Operator shall provide support for statistical reporting. Reports must be made available to the Owner upon request.

5.7.9 Operator shall implement systems to allow support for remote management and updates of remote system components from a central location.
5.7.10 As part of the scope of operational support and maintenance services, the Operator shall repair or replace any equipment that fails to operate per the design specifications. During the first twelve (12) months from the date that the Owner accepts the system, the Operator shall repair and/or replace at no additional cost to the Owner any failures or malfunctions resulting from normal use.

6. Proposal Technical Submittal Requirements

6.1 General Requirements

The proposer shall consider the following general requirements in preparation of its proposal:

6.1.1 The proposer shall propose a DAS solution that satisfies all the technical requirements included in this RFP. If not all of the technical requirements can be satisfied, the Proposer shall identify the applicable requirements with an explanation as to why such requirements cannot be met, proposed alternatives and any other relevant information.

6.1.2 The proposer shall complete a detailed RF survey of the required coverage areas to make a determination of planned equipment locations, antenna placement and cable routing needed in order to prepare the proposal. The Owner reserves the right to reject proposals that are not based on the outcome of a RF survey.

6.1.3 The proposer must identify any and all subcontractors and/or partner companies associated with any part of its proposal, describing their relationships and the roles of each company. The proposer shall provide contact information (name, title, phone number, e-mail, physical address) for each subcontractor. Additionally, the proposer shall provide three references for the same type of work to be performed by each one of its subcontractors.

6.1.4 Proposer must identify whether its response offers an active, passive or hybrid active/passive system, discussing the benefits of its proposed approach and reasons why such solution is superior in comparison to the other approaches not chosen (e.g., if the solution is an active system, why is it preferred over a passive or a hybrid solution).

6.1.5 The Proposer shall provide an estimated schedule for all major DAS milestones, including requirements completion, design completion and installation completion for each phase.

6.1.6 For statistical and management reporting, SFO will provide all the hardware and software required. The Proposer should only describe the mechanism of exposing operational data from the DAS for reporting purposes. Examples of DAS operational data will include usage, connections, protocols and durations across all applications using the DAS.
- Proposer should indicate what data sharing formats and standards are supported (e.g., WSDL, Oracle Views, XML or a combination of these, etc.)
- If proposer does have such mechanism, please describe in detail what mechanism it is.
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- If proposer does not have these mechanisms, please provide a data schema that would allow for detailed reporting.

6.2 Proposal Requirements Regarding DAS Applications

In its response to this RFP, the Proposer shall include the following information regarding DAS applications:

- Information about at least three DAS projects undertaken by the proposer where multiple cellular carriers are supported. Submittals shall include a description of any business or contractual relationship the proposer has with the cellular carrier that may have enabled this support at any of the three referenced locations.

- Explanation of how the proposed DAS satisfies the requirements of Section 5.2.

- The DAS shall provide support for public safety services (4.9GHz and 700/800MHz) and shall support distribution of all public safety signals. The Proposer shall explain how the DAS can provide interoperability among the various public safety systems.

- The proposer must consider that incorporation of the existing SFO Wi-Fi asset into the DAS is expected. In its proposal, the proposer must include a plan and schedule to expand and extend this asset. A new, duplicate Wi-Fi infrastructure can be included in a proposer’s submittal but it is not required.

- The proposer shall describe how the proposed location-based services will operate and how application providers will be able to interface with the location information. The proposer shall also explain which existing LBS solutions will be supported and how, and shall identify any known problems and any LBS solution that will NOT be supported. Furthermore, the proposer shall explain how its proposed solution will avoid interference with existing LBS solutions (such as TruePosition, etc.) which already exist in the marketplace.

- The proposer shall describe in its proposal how the e911 and 911 location services will be supported on the SFO DAS system.

- Identification of any of the applications outlined in this RFP that the proposed DAS cannot support. The Proposer shall explain how and when the non-supported applications may be supported in the future. Non-support for applications other than those required for cellular service will not disqualify an answer to this RFP, but the airport will strongly favor answers to this RFP that adequately show satisfaction of all the applications identified in this RFP.

- Identification of additional applications that the proposed DAS can support that are not included in the list of applications specified in this RFP. This is important for the evaluation panel in evaluating responses to this RFP. Responses that adequately demonstrate DAS applications that go beyond the list of applications outlined in this RFP may merit higher points.
6.3 Proposal Requirements Regarding System Architecture

In its proposal, the Proposer shall consider the following regarding the system architecture of the DAS:

6.3.1 Information about the DAS architecture and a description of how that the system satisfies all the requirements outlined in this RFP; the proposer shall also provide information about all of the applications supported by the DAS, including those identified in this RFP and any additional applications. The proposer shall define and describe all components, systems, interfaces and preliminary antenna locations.

6.3.2 The proposer must include physical and logical diagrams that illustrate all aspects of the proposed DAS.

6.3.3 As indicated above, the DAS will include low-profile, flush-mounted, multi-band antennas installed throughout the Airport facilities. The Proposer shall include photographs of these antennas in its response to this RFP.

6.3.4 The proposer must provide explanations of how the proposed DAS operates. The Proposer shall explain how the DAS interfaces with and distributes the signals of each one of the systems corresponding to the applications identified in this RFP, as well as any additional applications supported by the proposed DAS. The Proposer must clearly explain how the proposed DAS will interface with each one of the cellular carrier systems currently operating at the airport; likewise, the proposer must explain how the proposed system will interface with other DAS applications.

6.3.5 Descriptions of all the security mechanisms and options available with the proposed DAS. The Proposer shall explain all security functions required in this RFP and any other security features that the proposed DAS provides.

6.3.6 Information regarding the capacity of the DAS to support cellular calls with and without other applications operating. This must be based on what typical cellular carriers require in facilities with comparable traffic volumes as the San Francisco Airport. The Proposer must identify independent references that confirm this data, such as other DAS implementation projects.

6.3.7 As indicated above, the DAS should provide a service level of 99.99 percent or better in connection with cellular service. Furthermore, a similar level of service is desired for other applications. The proposer should provide the costs associated with three reliability scenarios (99.9, 99.99 and 99.999 percent) in the Pricing Schedules included in Appendix D. If a 99.99 percent reliability level cannot be supported in connection with any non-cellular application-specific provider(s), the proposer shall state in its proposal which applications cannot be so supported and why.

6.3.8 Explanation of the mean time between failure (MTBF) for the DAS and processes used to guarantee reliability levels. This should be broken down into specific elements, in addition to a system-wide depiction.
6.3.9 Explanation of how the proposed DAS will migrate to accommodate future potential technologies and applications that go beyond those described in this RFP. The Proposer shall provide some insight and prediction about how technologies are likely to change and the corresponding impacts on the DAS.

6.3.10 The proposer shall explicitly discuss expansion of services in the 700Mhz band (ala, LTE or Long-Term Evolution, http://www.3gpp.org/Highlights/LTE/lte.htm).

6.3.11 Identification of electrical power voltages and total electrical power requirements. This is necessary to determine total power consumption requirements of the DAS (not including specific application service components that interface with the DAS). The Owner will pay for the system’s electrical power requirements.

6.3.12 Explanation of any additional functions of the proposed DAS that go beyond what this RFP is requesting. The Proposer shall explain mediations and additional costs (if any) to realize these additional functions.

6.3.13 Product manufacturer specifications for all equipment, antennas, and cabling for the proposed DAS. The Proposer shall identify all product vendors and include vendor-supplied specifications in the appendix of its submittal.

6.3.14 Margin calculations to support assertions that the coverage levels will be met. The Proposer’s use of models based on industry in-building software packages is allowed as long as the results are included on the AutoCAD drawings provided with this RFP. Proposers must include sufficient details so that the Airport can make an adequate evaluation of the information submitted.

6.3.15 Costs for all system hardware, software and the systems that comprise the Base System; these costs shall be included in the amounts presented in the Pricing Schedules (Appendix D).

6.3.16 Costs for hardware, software and the systems for interfacing additional cellular carriers to the Base System; these costs shall be included in the amounts presented in the Pricing Schedules (Appendix D).

6.3.17 References and descriptions of similar DAS deployments. The Proposer shall include applicable contact information for the references and descriptions of DAS deployments to validate that the Proposer has the experience necessary for deploying a DAS that satisfies all the requirements within this RFP.

6.3.18 Proposer shall state in its response to the RFP whether its proposed solution allows adding, upgrading and swapping components without proprietary constraints, such that maintenance and support after installation can be performed by either, the Contractor in charge of installation or by other qualified entities.

6.4 Proposer Requirements Regarding Design Services

In its response to this RFP, the Proposer shall include the following information regarding design services:
Appendix C  
Distributed Antenna System for San Francisco International Airport  
Technical Requirements

6.4.1 Explanation of the design approach that the Proposer, if selected, will implement. The approach should define general design principles, goals and objectives.

6.4.2 Detailed costs for all services necessary to design the overall architecture that satisfies requirements of all the applications identified in this RFP. Proposers shall include this pricing information in the amounts presented in the Pricing Schedules (Appendix D).

6.5 Proposer Requirements Regarding Installation Services

In its response to this RFP, the Proposer shall include the following regarding installation services:

6.5.1 The Proposer shall provide a top-level installation plan describing major tasks, schedule, resources, and anticipated risks / recommended resolutions for installing the DAS. This plan must address the particularities of the San Francisco Airport environment and anticipated DAS applications.

6.5.2 Explanation of any major physical changes that must be made to the airport facilities to accommodate the installation of the DAS. The airport will review these physical change requests to determine feasibility and related costs. Substantial changes to the airport facilities could reflect negatively on a proposed solution. As a result, Proposers should propose a solution that minimizes major facility changes.

6.5.3 Name and resume of the installation manager and any other key personnel that are anticipated to be on-site on a daily basis. The Proposer shall only include personnel who are fully qualified to manage all the activities related to deployment of the DAS. The airport may elect to interview any proposed personnel prior to selecting the winning Proposer.

6.5.4 Description of space and general location requirements for the installation of all backend equipment. This includes any components of the DAS except antennas and cable runs.

6.5.5 Description of space and general location requirements for storing equipment and supplies during the installation process. These locations may include temporary sites.

6.5.6 Description of office requirements for personnel involved with management and installation of the DAS.

6.5.7 Installation schedule that meets the requirements within this RFP for deploying the Base System (plus the additional systems to support all the cellular carriers). The schedule shall identify all phases and tasks related to the installation of the DAS.

6.5.8 Detailed costs for all services required to install the Base System. Proposers shall include this pricing information in the Pricing Schedules contained in Appendix D.

6.5.9 Detailed costs for all services required to interface additional cellular carriers to the Base System. These costs should be provided for each application type. Proposers shall include this pricing information in the Pricing Schedules included in Appendix D.
6.6 Proposer Requirements Regarding Verification Testing and Acceptance

As indicated above, the DAS shall pass all verification test plan requirements prior to the Owner accepting delivery of the system. If the Contractor fails to satisfy all requirements, the applicable requirements must be met within 60 days. Corrective actions to the DAS may require additional verification testing to ensure that requirements have been met. In their response to this RFP, Proposers should take this into consideration in their proposals. In addition, the Proposers shall include the following regarding verification testing and acceptance:

6.6.1 An outline of a proposed test plan for verifying the installation of the Base System. Proposers are encouraged to use a grid test method with grid sizes of 25 feet by 25 feet.

6.6.2 An outline of a proposed test plan for verifying the interfacing of the DAS to additional cellular carriers and applications going beyond the Base System

6.6.3 Margin analysis to demonstrate that the proposed DAS will be able to pass the verification testing.

6.7 Proposer Requirements Regarding Operational Support Services

In its response to this RFP, the Proposer shall include the following information regarding operational support:

6.7.1 Proposed Service Level Agreement (SLA) for the DAS.

6.7.2 Complete explanation of the network operational support organization, processes and systems. This shall include a recommendation on how the Tenants’ help desks, which interface directly to end users, should triage and escalate problems to the Operator.

6.7.3 The Proposer’s plan to design and document the demarcation between the Application-specific Interface layer and the Application-specific Provider Base Station. To ensure rapid fault isolation and minimize mean-time-to-repair, the design must have the capability to quickly detect and notify on which side of this demarcation the problem lies (within the SFO DAS or within the vendor’s system).

6.7.4 Explanation of how the proposed DAS addresses the five ISO network management functions summarized below:

- Performance Management – Measures and makes available various aspects of network performance so that inter-network performance can be maintained at an acceptable level. Examples of performance variables that might be provided include, but are not limited to: network throughput, user response times and component utilization.
- Configuration Management – Monitors network and system configuration information so that the effect of configuration changes (intentional or unintentional) can be tracked and managed.
- Accounting Management – Measures network-utilization parameters so that individual or group uses on the network can be regulated appropriately. Such
regulation should minimize network problems and maximize the fairness of network access across all domains and users.

- Fault Management – Detect, log, and notify support organizations and users (where appropriate) of network problems. This should include proactive determination of symptoms, isolation of problems and rapid resolution.
- Security Management – Control access to network and system resources according to defined policies so that the network cannot be sabotaged (intentionally or unintentionally) and those without appropriate authorization cannot access sensitive information.

6.7.5 A list of all of the proposed spare parts including the manufacturer’s name and the part/mode number. These spares should comprise approximately five (5) percent to fifteen (15) percent of the total system. Proposers shall indicate the proposed percentage of spares for major components of the DAS.

6.7.6 A strategy and a detailed plan for future replacement of any DAS equipment as it becomes obsolete, difficult to service or difficult to maintain over a five (5) year period. In addition, the Proposer must include in the plan the intention to replace existing equipment with upgraded equipment having better performance and maintenance characteristics at future points during the life of the system.

6.7.7 Detailed costs for operational support of the DAS on an annual basis for six (6) years after acceptance of the system by Owner. This should include all assumptions for spare inventories, upgrade cycles, capacity upgrades or similar needs.
7. Miscellaneous Requirements

Based on input from cellular and radio service providers, the airport may need to include additional technical requirements beyond those that this RFP describes. The following are contacts at cellular and radio service providers currently serving SFO. They are aware of this RFP and may be contacted for company-specific information:

**AT&T Wireless**
- David Warwick
  - Real Estate & Zoning Manager
  - c/o AT&T
  - 4420 Rosewood Street, Bldg 2
  - Pleasanton, CA  94588
  - (925) 468-8509
  - dw989v@att.com

**Sprint-Nextel**
- Joel Linderoth
  - 335 Pierce Street
  - San Francisco, CA  94117
  - (415) 215-1303
  - joel.linderoth@sprint.com

**T-Mobile**
- Tom Derkas
  - 1855 Gateway Blvd, Suite 900
  - Concord, CA  94520
  - (925) 202-3333
  - tom.derkas@t-mobile.com

**Verizon Wireless**
- Bill Witkowski
  - In-Building Business & Technology Planning
  - One Verizon Way, Room VC51S271
  - Basking Ridge, NJ  07920-1097
  - (908) 559-7334
  - William.Witkowski@VerizonWireless.com

**ARINC, Inc.**
- John DeLoach
  - Aviation Radio for SFO
  - 1125 E. Hillsdale Blvd., Suite 104
  - Foster City, CA  94404
  - (650) 291-6349
  - jdeloach@arinc.com
7.1 Cellular and Radio Service Provider Responsiveness

As indicated above, in preparation of their responses proposers should consider contacting the cellular and radio service providers currently serving SFO (see list above) to discuss additional company-specific information. Responders are encouraged to include in their submittals any questions or concerns related to such discussions. Proposers may also submit these questions, as well as other questions about this RFP, to the following e-mail address: sfo.das.rfp@flysfo.com.