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Lexington-Fayette Urban County Government

PSOC Consolidation & BGA Upgrade Options

LFUCG and BGA Expansion Proposal

April 22, 2015

Contents

	Cover Letter	3
1	Proposal Scope	4
2	Coverage Projections	8
3	Warranty and Maintenance	23
4	Key Contacts	24
5	Terms and Conditions:	25

AIRBUS DS COMMUNICATIONS

March 20, 2015

Robert Stack, Director
Division of Enhanced 911
Lexington-Fayette Urban County Government
200 E. Main St., Room 313
Lexington, KY 40507

Dear Director Stack:

Airbus DS Communications is honored to respond to Lexington-Fayette Urban County Government's request for firm-fixed pricing for the PSOC consolidation and to upgrade BGA to a 9-Channel Simulcast Site comparable to the other LFUCG simulcast sites. I think you'll find our proposal addresses your request and needs.

On behalf of Airbus DS Communications, thank you for this opportunity. We greatly appreciate our partnership!

Respectfully submitted,

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1 Proposal Scope

Airbus DS Communications understands that Lexington-Fayette Urban County Government (LFUCG) will be consolidating Police and Fire Dispatch and moving to their new Public Safety Operations Center (PSOC).

This proposal includes the following options based on the needs assessment and discussions with LFUCG:

1. Relocate existing radio console dispatch equipment to the PSOC which will connect back to the LFUCG PD HQ Equipment Room via the microwave network. The Avtec VPGate servers for the console system will be left at the LFUCG PD HQ equipment room as currently deployed.
2. Consistent with the previous LFUCG deployment of the P25 network, the microwave network will be backed up to LFUCG provided terrestrial fiber at the PSOC as done with the other radio sites deployed as part of the VESTA Radio P25 Network.
3. Deploy a new 9-channel simulcast site at the PSOC Facility.

OPTION 1 (RELOCATE EQUIPMENT TO PSOC):

As part of the LFUCG dispatch relocation Airbus DS Communications will have responsibility for the relocation of existing Scout Radio Console equipment currently utilized at the primary dispatch location (PDHQ) to the newly constructed PSOC to be located at 115 Cisco Road in Lexington, KY. Upon installation and operational cutover, the new PSOC located at Cisco Road will become the primary PD / FD dispatch center with a total of thirteen (13) console positions and PDHQ will become the backup PD / FD dispatch location with two (2) console positions.

Console equipment will be relocated and integrated into the LFUCG provided console furniture at the new PSOC and will include the integration of Control Station Radios (CSRs) provided by LFUCG as previously deployed for the original PDHQ PD dispatch center deployment. The CSRs will be deployed in a remote head configuration with user equipment and control heads located at the dispatch positions. The radio bodies and CSR combining equipment will be rack-mounted and located in the PSOC Communications Equipment Room. A new CSR antenna system will be installed at the Cisco Road PSOC to support the CSR equipment and radios.

The existing VESTA Radio and Avtec Console core servers are anticipated to remain located at PDHQ in their currently installed equipment racks with the sites being interconnected via both the expanded microwave network and backed up using LFUCG provided terrestrial fiber. Redundant network components will be installed and deployed at the Cisco Road PSOC inclusive of routers and switches to allow for the required interfacing to both the WAN and LAN networks.

Exhibit 4 includes diagrams detailing the changes included in this option to PDHQ. The equipment provided by Airbus DS Communications for option #1 is specified in Exhibit 5.

Airbus DS Communications will provide the following services:

- Provide and execute an Installation and Migration Plan
- Move 5 dispatch consoles from FD Communications Center to PSOC
- Move 2 VPGate servers from FD Communications Center to PSOC
- Move 8 dispatch consoles from PDHQ to PSOC
- Field removal, re-installation and testing of thirteen (13) console positions
- Field installation, testing and commissioning of new equipment to be deployed as listed above
- As-built documentation

LFUCG will be required to provide:

- The terrestrial fiber circuit at the PSOC provided by LFUCG is requested to terminate within 10 cable-feet of the Airbus DS Communications equipment. The demarcation shall be the end of the fiber jumper from the Local Carrier CPE to the Airbus DS Communications equipment. Airbus DS Communications is requesting single mode fiber operating at 1310 nm for the link. This fiber circuit must be capable of supporting Multicast IP Traffic similar to the other backup fiber circuits previously deployed.

OPTION 2 (CONNECT PSOC TO MICROWAVE AND ADD TOWER WITH FIBER BACK-UP):

As part of the LFUCG dispatch relocation to the new Cisco Road PSOC Airbus DS Communications is proposing the integration of the new PSOC into the existing microwave ring. In this configuration the microwave will serve as the primary communication path and be backed up by LFUCG provided fiber.

Given the overall geography and initial path evaluations, the integration of the Cisco Road PSOC into the microwave ring will require the erection of a new tower to provide the necessary elevation for the microwave antennas and required path performance.

Airbus DS Communications will provide a self-supporting 150' AGL tower on the western side of the Cisco Road PSOC. The tower will be located between the rear parking lot and the concrete side walk that skirts the side of the facility inside the existing fence-line. The details about the technical specifications of the tower are shown in Exhibit 6 and details about the tower foundation can be found in Exhibit 7. Additionally, a new one room, 12' x 20' communications shelter will be installed at the end of the parking lot on the western side of the PSOC facility to house the new radio and microwave equipment to be deployed at the site. Protected power for the shelter will be supplied from the PSCO facility which includes an 80KW generator for site backup power being installed as part of the LFUCG retrofit of the facility. Additionally, Airbus will provide as part of the shelter a battery backup UPS consistent with those deployed for the existing P25 radio sites for independent backup of the critical communication infrastructure. An ice-bridge will be provided as part of the installation to provide the necessary transmission line support between the shelter and the new tower and conduit will be run between the PSOC facility and new shelter for both facility power and communications. The microwave deployment as the PSOC will utilize a split system as done with the previous deployment with the indoor microwave equipment being installed in the new shelter.

To add the Cisco Road site into the existing LFUCG microwave ring, the following links were added:

- Cisco Road to WLEX

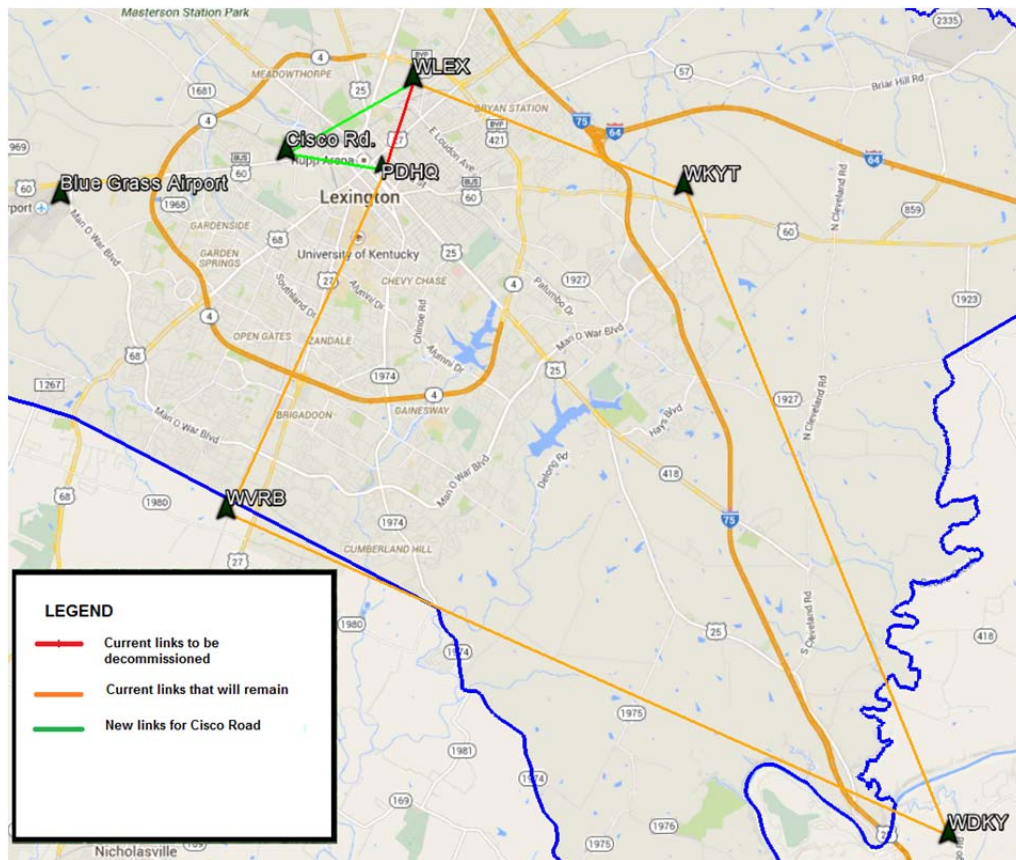
- Cisco Road to PDHQ

The following link will be decommissioned:

- WLEX to PDHQ

Both new links were designed using the same parameters as the rest of the existing LFUCG microwave ring, including reliability of $\geq 99.999\%$ and a 1+1 configuration. The Cisco Road to WLEX link was designed as a 6 GHz link with 6' dishes at each end. The Cisco Road to PDHQ link was designed as an 11 GHz link with 2.5' dishes at each end.

The detailed analysis of the Microwave design is described in Exhibit 2. A diagram of the microwave ring with the new Cisco Road site is shown below:



The equipment provided by Airbus DS Communications for Option #2 is specified in Exhibit 5.

Airbus DS Communications will provide the following services:

- Field Installation, Testing and Commissioning
- As-Built Documentation

OPTION 3 (DEPLOY A 9-CHANNEL SIMULCAST SITE AT THE PSOC FACILITY):

Airbus DS Communications proposes to deploy a 9-channel simulcast site at the PSOC facility to enhance coverage. The PSOC simulcast site will be comparable to the LFUCG WWRB and WDKY sites. Master

repeaters would be left as they currently are deployed. The PSOC site was designed with Omni directional antennas with 3 degrees of electrical downtilt.

All P25 equipment would be racked and installed in the new communications shelter being provided as described in option #2, above.

The equipment provided by Airbus DS Communications for option #3 is specified in Exhibit 5.

Airbus DS Communications will provide the following services:

- Provide and execute a Cutover Plan
- Field Installation, Testing and Commissioning
- As-Built Documentation
- Automated Drive Testing of the geographical area affected by Cisco Road

DEPLOYMENT SCHEDULE

Exhibit 1 includes a description of the schedule and share of responsibilities. The schedule assumes that options 1-3 are executed and can begin at the same time after contract signature. Airbus DS Communications recognizes the desire of the LFUCG to complete this project by April of 2016 and will work with the LFUCG to compress the schedule to meet this desire.

2 Coverage Projections

INTRODUCTION

Airbus DS Communications ("Airbus") is proposing a modification to the existing VESTA Radio Network solution for Lexington-Fayette Urban County Government (LFUCG), KY, based on a 800 MHz Project 25 (P25), Land Mobile Radio (LMR) simulcast method.

Airbus is proposing that the current 800 MHz Project 25; two cell, twelve (12) channel system consisting of a simulcast cell consisting of four (4) simulcast transmit and receive sites, and a multicast cell consisting of one (1) multicast transmit/receive site, be enhanced to include five (5) simulcast and one (1) multicast transmit/receive sites (see Table 1). This new simulcast will provide 95% area coverage and reliability for portable units on the hip on the street, and 95% coverage at the hip inside buildings with a 10 dB penetration loss.

Site	Latitude	Longitude	Site Type
Blue Grass Airport	38-2-14 N	84-35-48.2 W	Multicast
WLEX	38-3-56.5 N	84-29-13.5 W	Simulcast
WKYT	38-2-22 N	84-24-11 W	Simulcast
WVRB	37-57-37 N	84-32-42 W	Simulcast
WDKY	37-52-50.9 N	84-19-15.9 W	Simulcast
Cisco Road	84-35-48.3 N	84 31 35.6 W	Simulcast

Table 1 *Candidate Site List*

DESIGN ASSUMPTIONS

- System technology: P25 Phase 1 (linear modulation), designed with Phase 2 fade margins
- Frequency band : 800 MHz
- Configuration of P25 sites : Simulcast and Multicast
- Delivered Audio Quality (DAQ)
 - 3.4 DAQ for Mobile operations
 - 3.4 DAQ for Portable operations
- Area Coverage
 - ≥ 95% Area Coverage for portables (on hip) operating on-street with a 95% reliability
 - ≥ 95% portable indoor coverage on hip (10 dB penetration loss)
- Clutter and Terrain Data
 - Derived from United States Geological Survey (USGS) 30m resolution data
 - Employing TSB-88 standard loss factors per clutter type.
- Simulcast specific gains :
 - Uplink : Rx macro-diversity gain
 - Gain is estimated to +3dB on average throughout the cluster
 - Downlink : Additional simulcast coverage overlap

- Gain is estimated to +3dB on average throughout the cluster
- Loss correction factors for Portable radio with ¼ wave antenna on the hip and no remote mounted antenna:
 - 10 dB Total Loss for Portable on hip the Street (Body Loss at hip + Antenna Correction Factor)
 - 20 dB Total Loss for Portable in a building at hip with a theoretical 10 dB penetration loss (Body Loss + Antenna Correction Factor + 10 dB building loss)
- Repeater:
 - P25 Receive Specifications:
 - TB5500i repeater - Static Sensitivity @ 5% BER : -120.5 dBm
 - RX system sensitivity: -125.6 dBm
 - P25 Transmitter Specifications:
 - P25 repeater output power: 39.8 W (46.0 dBm)
 - Top of Rack power balanced for each channel
- Typical TX equalized output power per carrier, at Top of rack: 43.3 dBm
- Antenna System:
 - Maximum TX Combiner losses : 2.7 dB (estimated for worse case, 250 – 500 KHz, channel separation utilizing the DSCC Series combiner)
 - Receive System Gain: 4.40 dB based on utilizing DS7PDU Series, RX Multicoupler with IP interface and ATS8TMA18, Tower Top Amplifier.
 - Lightning Arrestor Loss: Based on the use of DGXH+24DFDF-A PolyPhaser with a manufacture max insertion loss of 0.1 dB
 - Antenna Gain: 12.0 dBd (14.1 dBi) based on use of the BMR12-O-B1 Certified antenna (except where noted)
 - WVRB Antenna selected BMR 10-A-B1 with 12.0 dBd gain and a 220 degree pattern
 - WDKY Antenna selected BMR 10-A-B1 with 12.0 dBd gain and a 220 degree pattern
 - Cisco Road Antenna selected Sinclair SC412-H2LDF(D03-E5765) with 11.5 dBd gain and a 3 degree electrical downtilt.
 - The second BGA transmit Antenna selected Sinclair SC412-H2LDF with 11.5 dBd gain and no electrical downtilt.
 - Feedline insertion losses based on:
 - 1/2" Superflex coaxial cable losses = 2.00 dB/100ft @ 824 MHz
 - 7/8" coaxial cable losses = 1.03 dB/100ft @ 824 MHz
 - 1 5/8" coaxial cable losses = 0.614 dB/100ft @ 824 MHz

Note: Airbus factored an average insertion loss in the link budget of **2.5 dB** as the total feedline losses for the transmit antenna system and 0.5 dB maximum insertion loss for the receive antenna system. Feedline shall be selected for minimum insertion loss.

- Radio terminals – general specifications:
 - Mobile units (to be provided by LFUCG):
 - 4 W transmit powered adjusted to balance mobile RF path (36.0 dBm)

- 4 W transmit power for control stations.
- Static Sensitivity (5% BER) = -119.0 dBm.
- Mobile 3 dB gain antennas with 2 dB max cable loss (overall gain of 1.0 dB)
- Portable units (to be provided by others):
 - 3W transmit power (fixed)
 - Static Sensitivity (5% BER) = -119.0 dBm
 - Portable antenna type : 1/4 wave whip antenna
- Body-shielding effects (median portable antenna loss) :
 - portable outdoors, belt case at waist: 10 dB

FREQUENCY PLAN

The following table defines the frequency plan, call signs, and frequency distribution Airbus intends to implement in LFUCG. This frequency plan is utilizing the channels contained in the letter from the Region 17 800 MHz Public Safety Working Group (800 RPC) to LFUCG. This frequency list is pending FCC approval.

There will be no changes made at the BGA site

Function	Channel	Base Station Transmit	Base Station Receive	Location
P25 Trunked Simulcast	1	851.0625	806.0625	WLEX WKYT WVRB WDKY PSOC
	2	851.5375	806.5375	
	3	851.9875	806.9875	
	4	852.25	807.25	
	5	852.75	807.75	
	6	853.2875	808.2875	
	7	853.5375	808.5375	
	8	853.7875	808.7875	
	9	851.3125	806.3125	

Table 2 *Frequency Plan*

COMBINER PLAN

Airbus has developed a combiner plan for the simulcast cell to maintain a frequency separation that promotes the lowest insertion loss for the combiner while being practical for the implementation of the system. The frequencies in the frequency plan are subject to FCC licensing. See tables 3 – 4 below. The simulcast system will have a 9th channel that will be transmitted through a second transmit antenna and will not be part the 8 channel transmit combiner.

Channel	Combiner Tx1	Frequency Separation
1	851.0625	-
2	851.5375	475.0 kHz
3	851.9875	450.0 kHz
4	852.25	262.5 kHz
5	852.75	500.0 kHz
6	853.2875	537.5 kHz
7	853.5375	250.0 kHz
8	853.7875	250.0 kHz

Table 3 *Simulcast Cell Combiner Plan*

Channel	Combiner Tx1	Frequency Separation
1	851.2875	-
2	851.5625	275.0 kHz
3	852.0375	475.0 kHz
4	852.5375	500.0 kHz

Table 4 *Multicast Cell Combiner Plan*

LINK BUDGET

Portable Talk Out (Downlink)						
Site	Site Top of Rack Power	ERP from Site Antenna	Available Path Loss	Subscriber Unit RX Faded Sensitivity DAQ 3.4	Subscriber Unit Losses	Target RSSI (on hip)
WLEX	43.3 dBm	52.3 dBm	161.2 dB	-108.9 dBm	10.0	-98.9 dBm
WKYT	43.3 dBm	55.7 dBm	164.6 dB	-108.9 dBm	10.0	-98.9 dBm
WVRB	43.3 dBm	55.9 dBm	164.8 dB	-108.9 dBm	10.0	-98.9 dBm
WDKY	43.3 dBm	52.8 dBm	161.7 dB	-108.9 dBm	10.0	-98.9 dBm
PSOC	43.3 dBm	54.5 dBm	162.6 dB	-108.9 dBm	10.0	-98.9 dBm
BGA	43.3 dBm	56.5 dBm	165.4 dB	-108.9 dBm	10.0	-98.9 dBm
Portable Talk Back (Uplink)*						
Site	Portable Talk Out ERP	Subscriber Unit Losses	Available Path Loss	Site Receive System Gain	Site RX Faded Sensitivity DAQ 3.4	Target RSSI (on hip)
WLEX	34.8 dBm	10.0 dB	160.6 dB	16.4 dB	-113.8 dBm	-103.8 dBm
WKYT	34.8 dBm	10.0 dB	160.6 dB	16.4 dB	-113.8 dBm	-103.8 dBm
WVRB	34.8 dBm	10.0 dB	160.6 dB	16.4 dB	-113.8 dBm	-103.8 dBm
WDKY	34.8 dBm	10.0 dB	160.6 dB	16.4 dB	-113.8 dBm	-103.8 dBm
PSOC	34.8 dBm	10.0 dB	160.6 dB	16.4 dB	-113.8 dBm	-103.8 dBm
BGA	34.8 dBm	10.0 dB	160.6 dB	16.4 dB	-113.8 dBm	-103.8 dBm

Table 4 *Link Budget Calculation Result*

Mobile DAQ 3.4 faded sensitivity TO -108.9 dBm and TB -114.3 dBm

* An additional 1dB of margin is added to uplink sensitivity for Phase II operation

RF COVERAGE

Airbus has based the RF coverage predictions and antenna system design on TSB-88 recommendations and the requirements of LFUCG. The design is bound by the requirement to use specific candidate sites, restrictions from the Federal Communications Commission, and the parameters of the radio and antenna system design.

The coverage predicted from the candidate sites selected was evaluated using the methodology recommended by TSB-88, utilizing USGS clutter and terrain and analyzed making use of EDX SignalPro, Version 7.3.1. EDX SignalPro employs Anderson 2D modeling, a deterministic study model considered to be an industry standard.

COVERAGE REQUIREMENTS

To achieve the coverage for LFUCG, Airbus created coverage projection models for those sites selected as candidate sites.

The projected coverage created by Airbus meets or exceeds:

- 95% area coverage to Portable radios on the street throughout LFUCG
- 95% area coverage to Portable radios with a 10 dB In Building penetration loss throughout LFUCG

PROPAGATION STUDY AREA

Airbus has provided computer generated digital P25 radio coverage prediction plots for the simulcast solution being proposed. LFUCG site locations, coverage boundary, and major thoroughfares are clearly identified. See Figure 1.

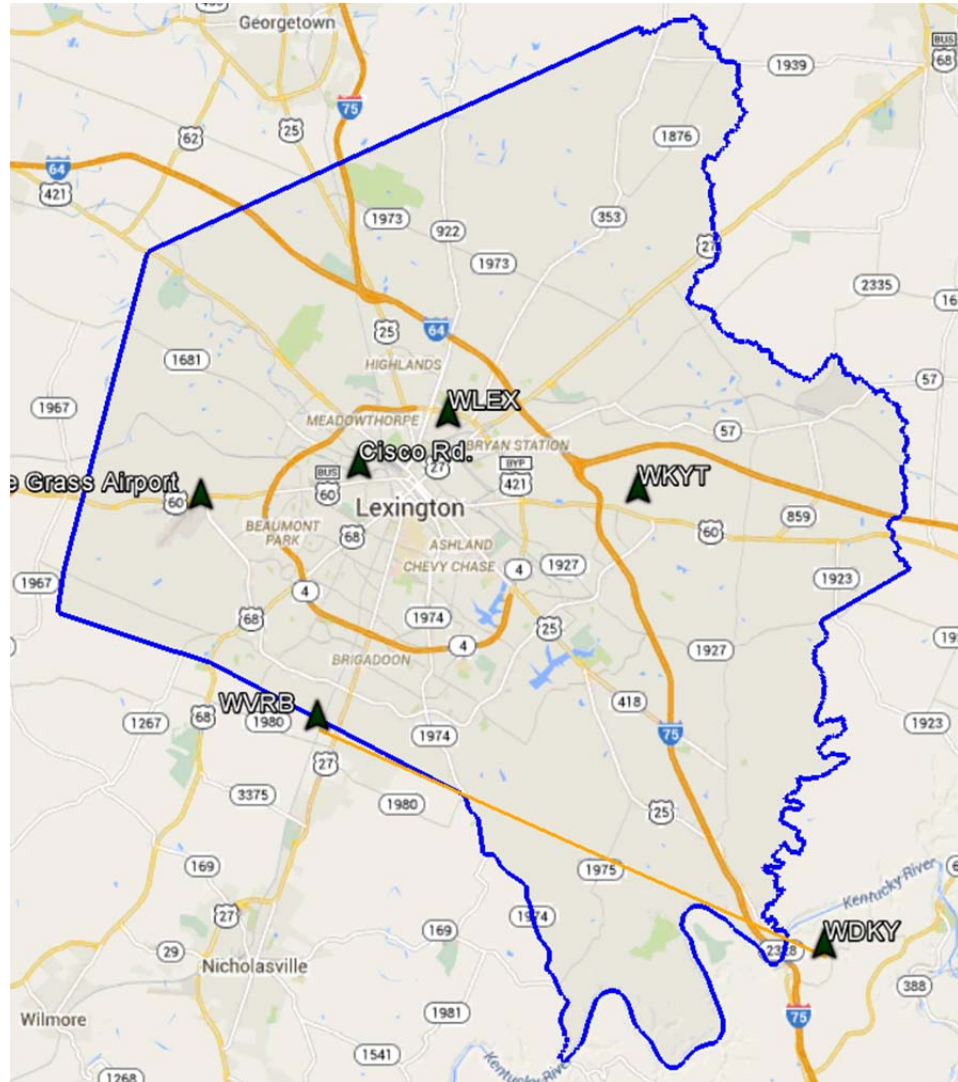


Figure 1 LFUCG Boundary

The predicted RF coverage is calculated using the EDX RF prediction tool (SignalPro 7.3.1). The RF coverage prediction software is a computerized simulation and is an accurate representation of the actual coverage and is based on the design parameters determined by Airbus, Radio Network Engineering. For ease of interpretation the predicted coverage maps generated are exported to a KMZ file and presented as an overlay on a Yahoo Map geo-coded to DMA.

COVERAGE DESIGN PARAMETERS

Site	TX Antenna						TX Feedline		TX Combiner
	Type	Beam-width	Height	Qty	Azimuth	tilt	Type	Qty	Comb #1
WLEX	BMR12-O-B1	360	400	2	360	0	AVA7-50A	580	DSCC85-08N
WKYT	BMR12-O-B1	360	488	2	360	0	AVA7-50A	570	DSCC85-08N
WVRB	BMR10-A-B1	220	210	2	30	0	AVA6-50A	250	DSCC85-08N
WDKY	BMR10-A-B1	220	370	2	300	0	AVA7-50A	490	DSCC85-08N
PSOC	SC412	360	150	2	360	0	AVA5-50A	150	DSCC85-08N
BGA	BMR12-O-B1	360	80	1	360	0	AVA5-50A	110	DSCC85-08N

Table 5 *TX Antenna System Design Parameters*

Site	RX Antenna					RX Feedline		Receive Multicoupler	Tower Top Amplifier
	Type	Height	Qty	Azimuth	Tilt	Type	Qty		
WLEX	BMR12-O-B1	420	1	360	0	AVA5-50A	600	DS7PDU-24AC	DS7TMA31-DA
WKYT	BMR12-O-B1	508	1	360	0	AVA5-50A	590	DS7PDU-24AC	DS7TMA31-DA
WVRB	BMR10-A-B1	230	1	30	0	AVA5-50A	275	DS7PDU-24AC	DS7TMA31-DA
WDKY	BMR10-A-B1	370	1	300	0	AVA5-50A	350	DS7PDU-24AC	DS7TMA31-DA
PSOC	SC412	150	1	360	0	AVA5-50A	170	DS7PDU-24AC	DS7TMA31-DA
BGA	BMR12-O-B1	100	1	360	0	AVA5-50A	140	DS7PDU-24AC	DS7TMA31-DA

Table 6 *RX Antenna System Design Parameters*

RF COVERAGE ESTIMATION CONFIDENCE

There are 3 elements of the measurement of confidence in the EDX RF prediction tool; area, location, and time:

Area calculations are from TSB-88 and are demonstrated as either Area Covered or Bounded Area Covered (BAPC). The Airbus design and this report uses the Area Covered method and is the accumulation of 30 meters bins (within the defined polygon) that meet or exceed the link budget design values per bin and any related time and location confidence values as described below:

Percentage of time is based on the amount of signal fades over time in any given location based on the velocity (stopped, slow, fast) of the terminal and is referenced using TSB-88 by a Digital Audio Quality signal or DAQ. A DAQ of 3.4 (or equivalent measurement of a Bit Error Rate of 2.0%) yields a 17.7 dB design fade margin. From various technical resources, such as the IEEE or TSB-88, for a worst case of fast movement (resulting in fast fading or “Raleigh” fading), a value of 17.7 dB yields a confidence factor of greater than 95%. The excess fade margin will be required during the Coverage Acceptance Test Plan (CATP) phase using the **Bounded Area Percentage Coverage (BAPC)** method since the equivalent 95% confidence tiling method, while using the Monte Carlo method and >>100 attempts at each tile, is equivalent to 98% Area Coverage.

Percentage of location from TSB-88 is characterized with a 50% design margin in the EDX propagation module with a 10 dB margin to ensure a 30m tile reliability of 95% assuming a better than 7 dB standard deviation. The location confidence correlates a single point to a 30 meter by 30 meter bin size. The better than 7 dB standard deviation establishes the difference between drive test data and the predicted signal level across the tile and is used to establish the quality of the data taken. If the standard deviation is worse than 7 dB then TSB-88 recommends a standard deviate adjustment. For standard deviations of 7 dB a deviate of 1.88 (for 95% confidence) is required and this suggests a margin of 13.2 dB. However, from data collected on actual systems, a 13.2 dB margin is far too conservative. Airbus has determined that a margin of 10 dB more accurately represents the actual margin required to achieve 95% reliability.

PREDICTED COVERAGE ANALYSIS RESULTS

Airbus has prepared an analysis of the predicted RF coverage calculated using the EDX RF prediction tool (SignalPro 7.3.1). The following results are representative of the actual coverage expected and are based on the design parameters determined by Airbus, Radio Network Engineering and the parameters contained within this document. Refer to Table 7.

Talk out	Target Signal Level	Total Service Area	% of Total Query Area
Portable On Street	-98.9 dBm	730.084 km ²	≥95%
Portable 10 dB	-88.9 dBm	708.835 km ²	≥95%
Talk back	Target Signal Level	Total Service Area	% of Total Query Area
Portable On Street	-103.8 dBm	728.823 km ²	≥95%
Portable 10 dB	-93.8 dBm	703.205 km ²	≥95%

Table 7 Coverage Analysis Results

Exhibit 3 includes the detailed procedures for how the coverage will be tested.

SIMULCAST TIME DELAY INTERFERENCE (TDI)

These potential interferences are also known as Inter-Symbol Interferences (ISI). The P25 system will utilize a linear modulation technology for improved simulcast performance. With such a modulation on the Downlink, the maximum allowed delay spread reaches 50 μ s for mobiles at DAQ 3.4 (2.0% BER).

The P25 design is such that the sites are minimized and the maximum inter-site distance between the sites is less than 12 miles so the potential for TDI is minimized.

CONSOLIDATED COVERAGE MAPS

The following coverage maps show the composite coverage for the LFUCG system. These maps represent the normal operating mode of the system and represent the day-to-day performance of the system. The **EDX SIGNALPRO 7.3.1** propagation prediction tool was utilized to produce the coverage represented by the following maps and is a result of the design parameters specific to LFUCG. For ease of interpretation the predicted coverage maps generated are exported to a KMZ file and presented as an overlay on a Yahoo Map geo-coded to LFUCG. See figures 2 – 6.

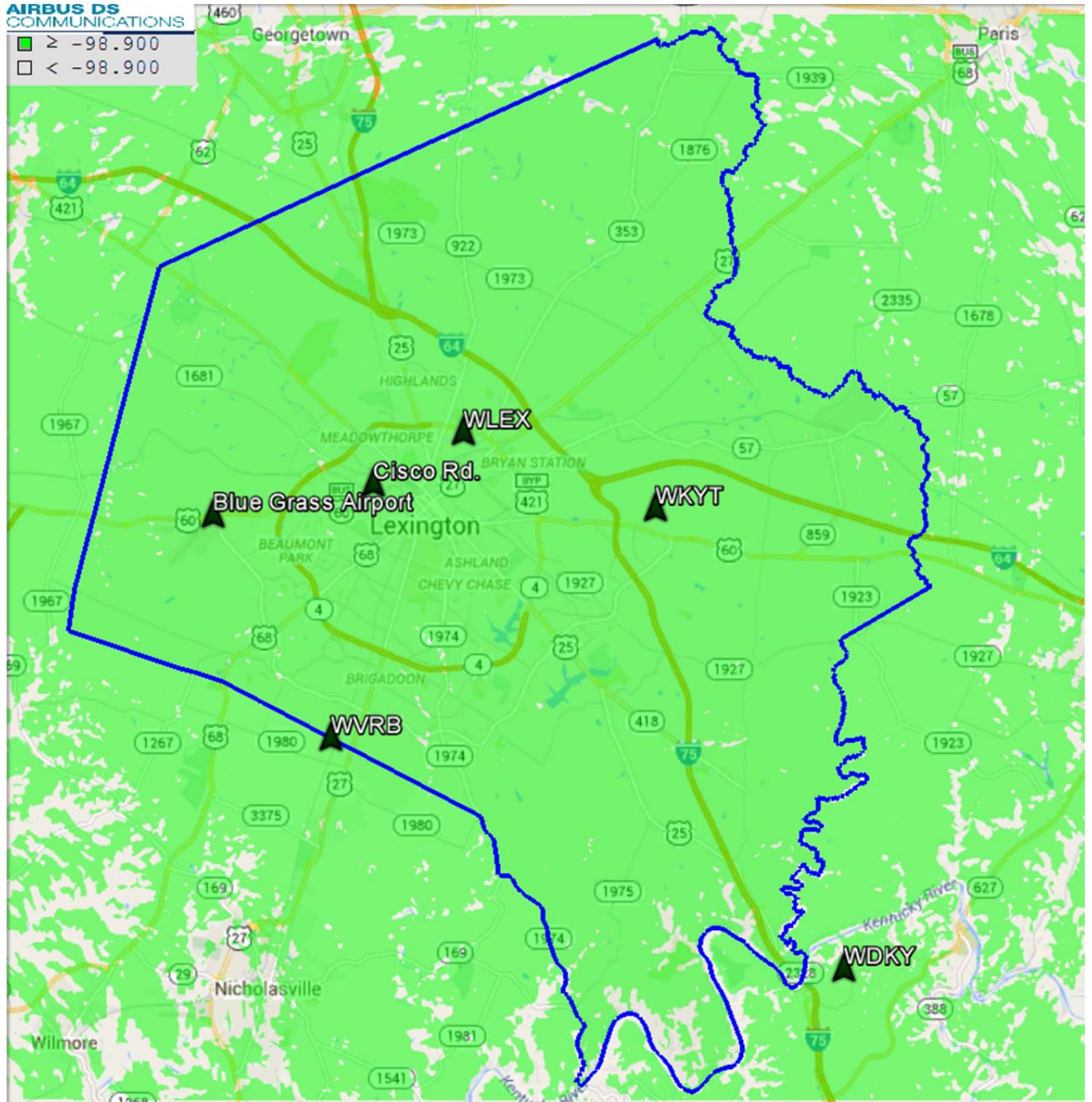


Figure 2 Portable, Talk-Out Coverage, at hip, On Street (> 95 %)

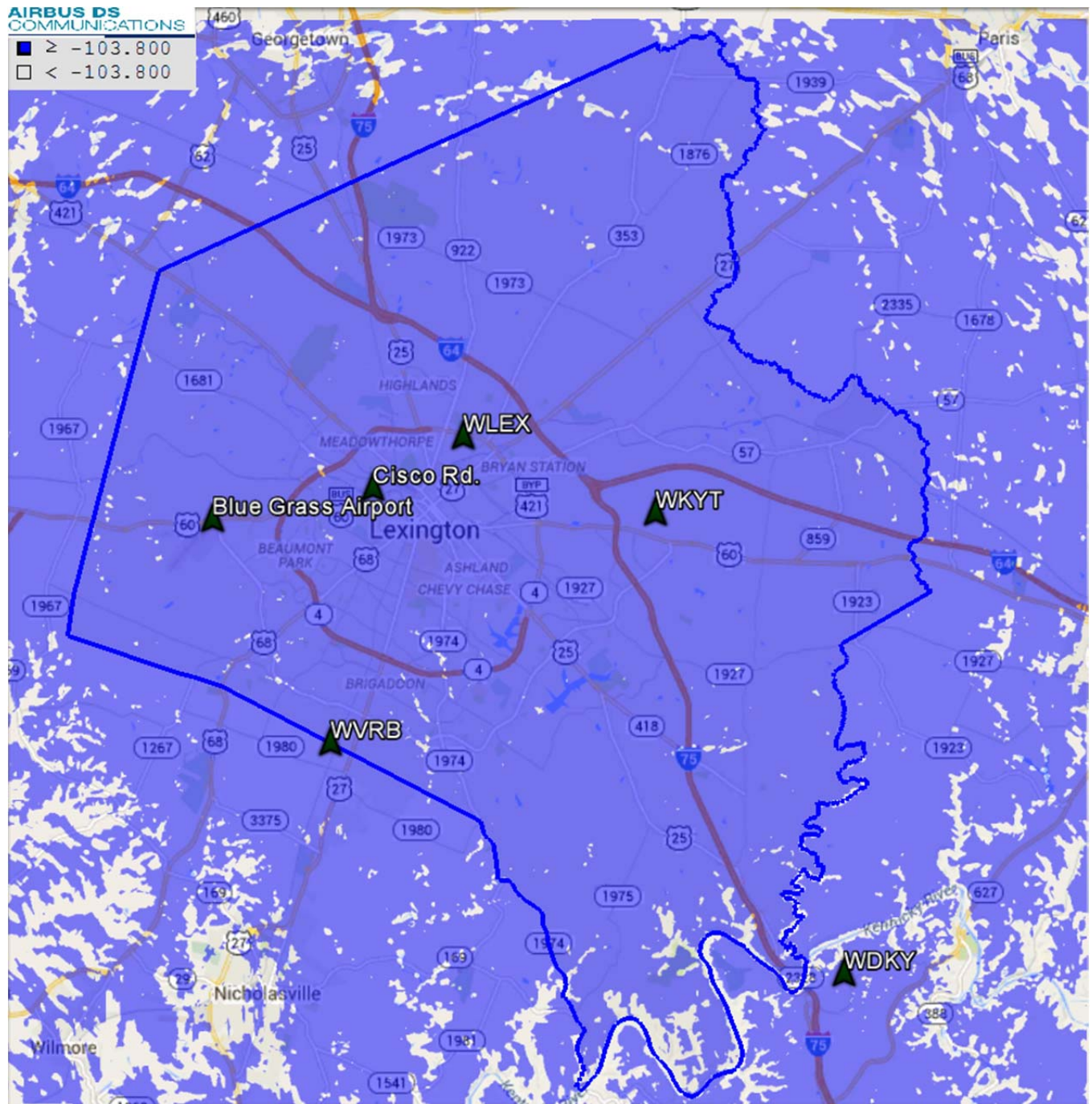


Figure 3 Portable, Talk-Back Coverage, at hip, On Street (> 95 %)

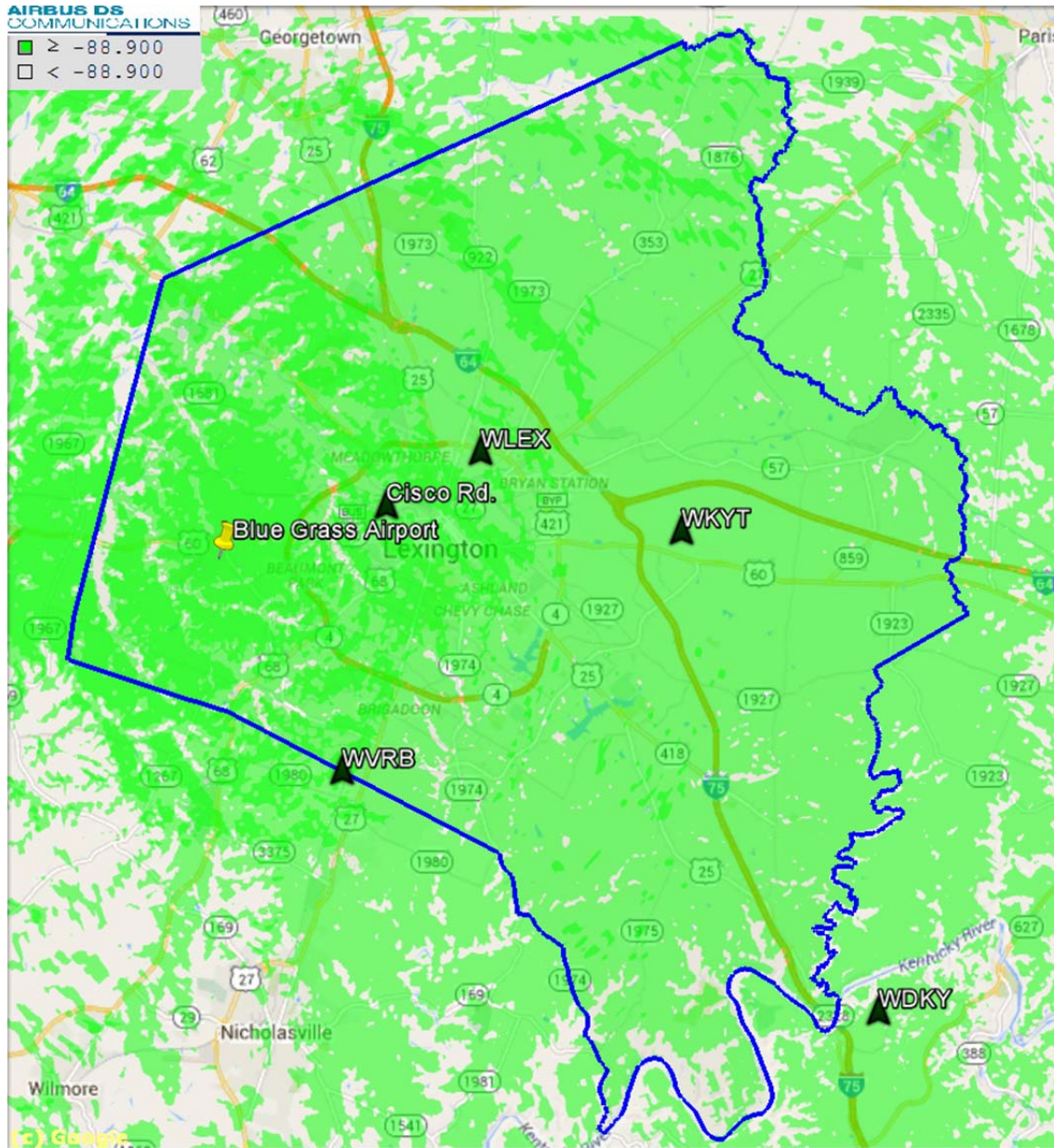


Figure 4 Portable, Talk-out Coverage, at hip, 10 dB In Building (> 95 %)

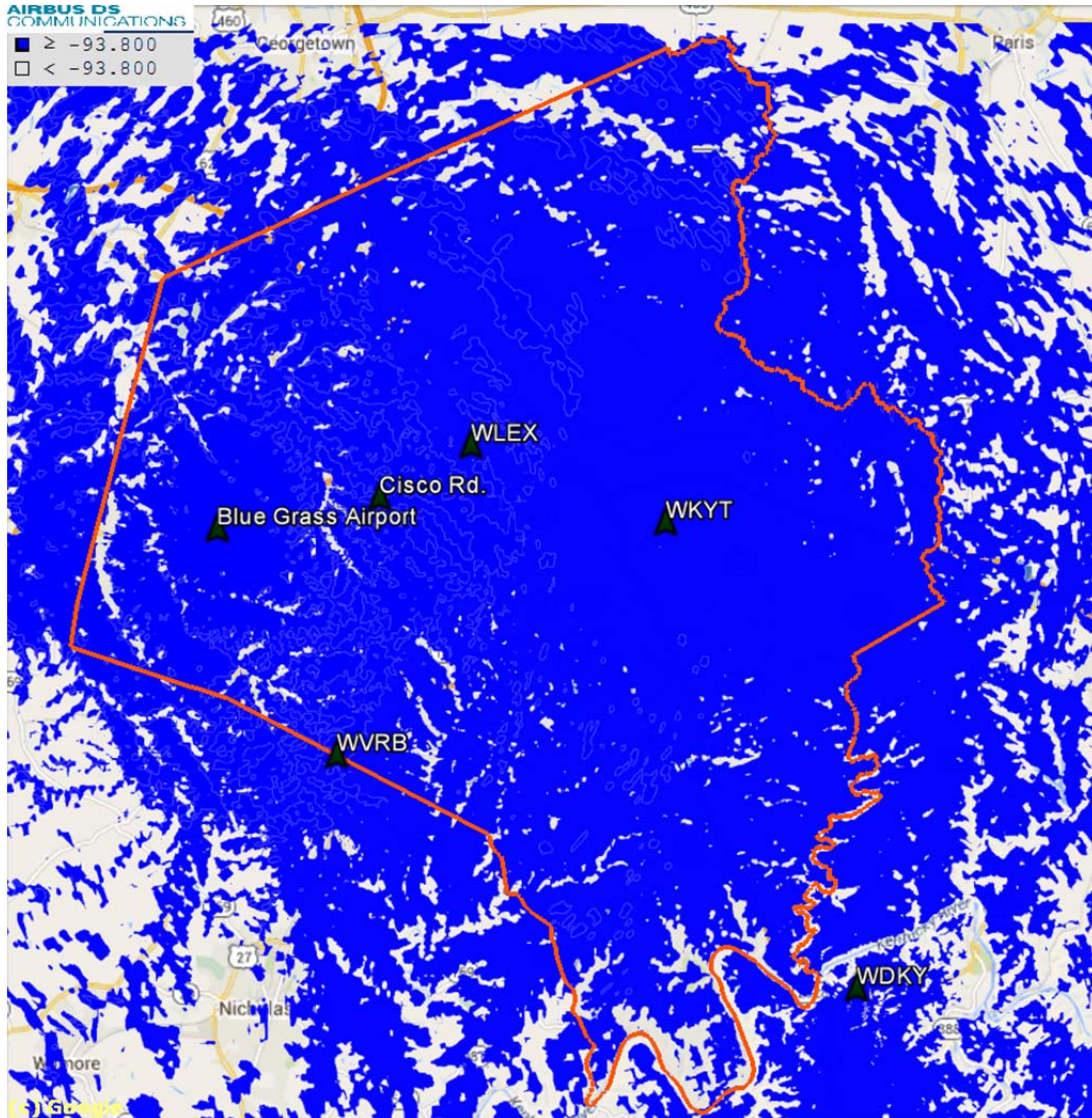


Figure 5 Portable, Talk-back Coverage, at hip, 10 dB In Building (> 95 %)

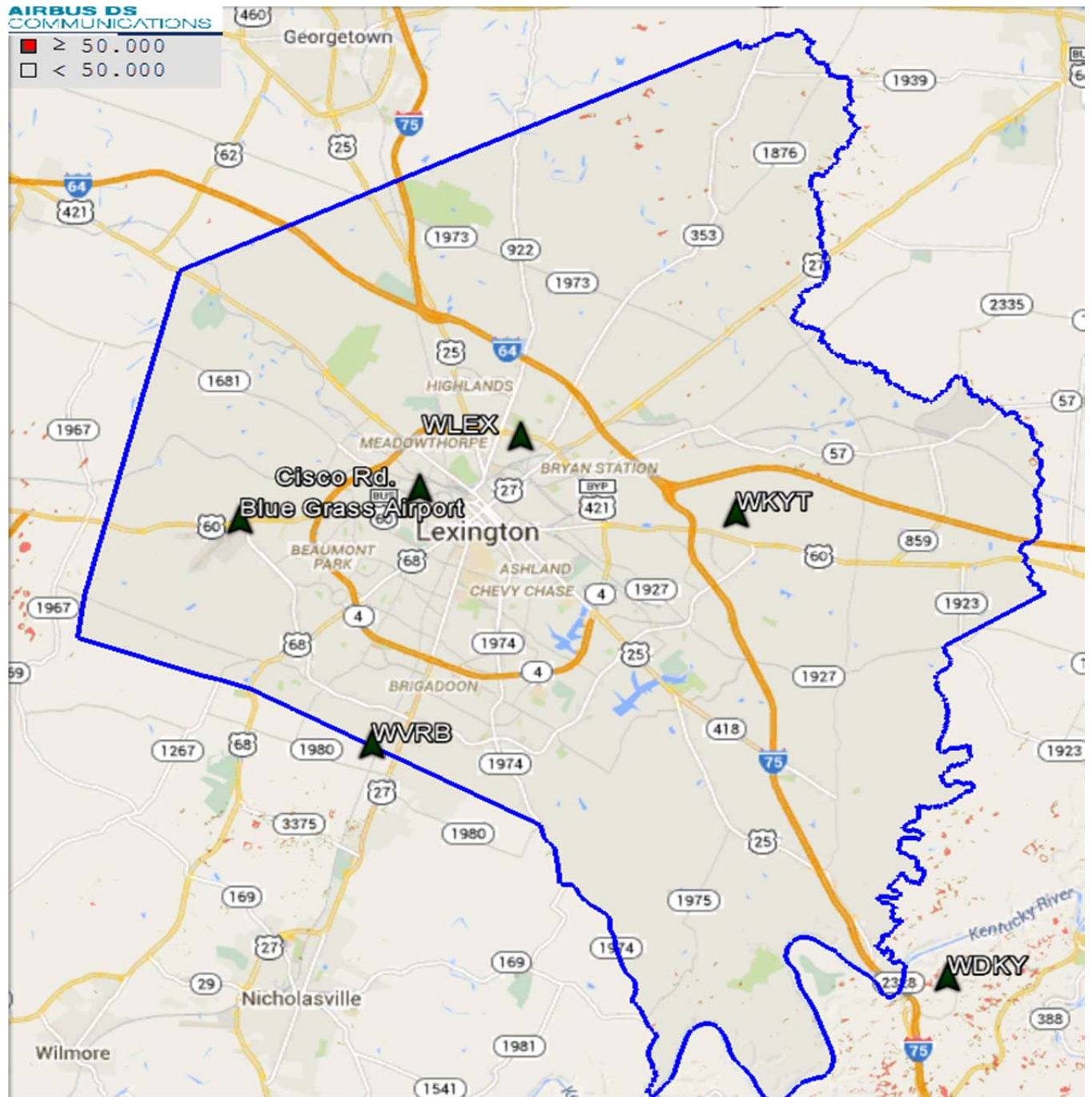


Figure 6 Simulcast Delay Spread, 50µs (≥ 95 %)

3 Warranty and Maintenance

The scope of the maintenance services for this offer shall be aligned with the conditions offered to LFUCG in the agreement for purchase of the original system. The warranty period for the *system additions described in this Proposal (the "System Additions")* commences on final acceptance and continues for a period of 12 months. Limited Maintenance for year following the completion of the warranty period of the *System Additions* is priced in Exhibit 5. This co-terms the coverage of the *System Additions* with the coverage for the original system described in our purchase agreement dated May 17th, 2012 Agreement section, paragraph 2, B.

LFUCG has the option to purchase for the *System Additions*, Extended Warranty Services for Years Two (2) through Eight (8) corresponding to years 2017-2023, provided that these services are companion to the purchase of Extended Warranty Services as described in the original purchase agreement.

At such time, the *System Additions* maintenance services align with the terms of the purchase agreement for the original system. LFUCG then has the option to purchase the extension of either Limited Maintenance Services, or Extended Warranty Services for Years Four (4) through Ten (10), per the terms described in the original purchase agreement, with the following exception; The price for either option will reflect the addition of the amounts quoted in this offer for Limited Maintenance or Extended Warranty Services.

4 Key Contacts

KEY CONTACTS

We are committed to serving LFUCG needs to enable your first responders with quality equipment and services.

If LFUCG should have any questions regarding this proposal, please contact:

	Sales Contact:	Coty Cooper Regional Account Manager Coty.Cooper@Airbus-DSComm.com Ph. 214.608.9457
	Technical Contact:	Sherman Banks Technical Sales Engineer Sherman.Banks@Airbus-DSComm.com Ph. 469.585.8458

5 Terms and Conditions:

Except as otherwise modified in this Proposal, all other terms and conditions of the Purchase Agreement entered into as of May 17, 2012 (the "Purchase Agreement") among Lexington-Fayette Urban County Airport Corporation, Lexington Fayette Urban County Government, and Cassidian Communications, Inc. govern each party's obligations as set forth in this Proposal. All references to "Cassidian Communications, Inc." are hereby replaced with "Airbus DS Communications". All attached Exhibits are incorporated by this reference into this Proposal. To the extent that any Exhibit conflicts with this Proposal, this Proposal prevails. By executing in the space provided below, this Proposal is deemed a Change Order (pursuant to Section 8 of the Purchase Agreement) and thereby amends the terms of the Purchase Agreement.

In witness thereof, this Proposal has been duly executed by the parties and effective as of March ____, 2015.

Lexington-Fayette Urban County Government

Airbus DS Communications, Inc.

By: _____

By: _____

Name: _____

Name: _____

Title: _____

Title: _____

Lexington-Fayette Urban County Airport Corporation

By: _____

Name: _____

Title: __



Lexington-Fayette Urban County Government

PSOC Consolidation & BGA Upgrade

Exhibit 1 – Project Schedule and SOR

Table of Contents

1	Proposed Project Schedule	3
1.1	Proposed Project Timeline	4
1.1.1	Project Planning Stage	5
1.1.2	Project Design Stage.....	5
1.1.3	Project Production Stage.....	5
1.1.4	Project Installation Stage.....	6
1.1.5	Project Integration and Validation Stage.....	6
1.2	Schedule Assumptions	7
1.3	Project Key Milestone Dates.....	8
1.3.1	Milestone Dependencies	8
2	Share of Responsibility	11

Figures

Figure 1	Proposed Project Timeline.....	4
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Tables

Table 1	Project Milestone Dates	10
Table 2	Lexington-Fayette Urban County Government Required Deliverables.....	10
Table 3	Share of Responsibility	11

1 Proposed Project Schedule

This section presents a Preliminary Project Schedule which provides a high-level description of the tasks to be performed to ensure the successful execution of the schedule and the project.

Airbus DS Communications has included a Preliminary Project Schedule in MS Project format with this submittal to the Lexington-Fayette Urban County Government (LFUCG). The proposed project timeline is illustrated in [Figure 1](#).

1.1 Proposed Project Timeline

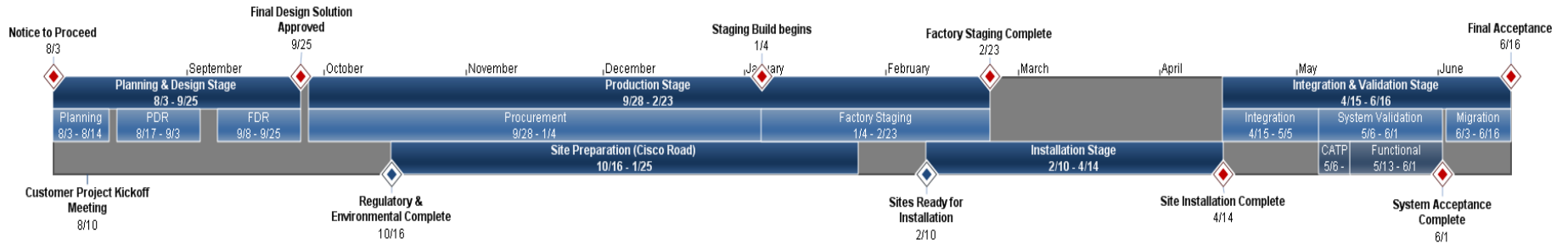


Figure 1 Proposed Project Timeline

1.1.1 Project Planning Stage

An executed contract, or the receipt of a Notice to Proceed, signals the assignment of Airbus DS Communications project resources. During the planning stage, the Airbus DS Communications project manager will mobilize the Airbus DS Communications project team and hold a Project Kickoff Meeting together with Lexington-Fayette Urban County Government representatives.

1.1.2 Project Design Stage

The design stage includes all the elements covered in the Preliminary Design and Final Design phases including the following work activities at a minimum:

- Technical Solution Design
- Coverage maps updated
- Radio Frequency (RF) Planning
- Antenna system design refined
- Acceptance Test Protocols
- Site planning completed
- Design Reviews
- Drawings updated

1.1.3 Project Production Stage

During the Production Stage, equipment is procured, staged and provisioned at an Airbus DS Communications staging facility. Once these activities are complete, the components will undergo factory testing prior to being crated up and delivered to Lexington, KY.

In parallel, Site Preparation activities at the Public Safety Operations Center (PSOC) will take place including the installation of a new shelter and new tower to prepare the Cisco Road site for equipment installation.

1.1.4 Project Installation Stage

When the sites are ready, the Installation Stage can take place. Major work activities during the Installation Stage include:

- RF Antenna installation
- Radio Site equipment installation
- Equipment Integration
- Site Provisioning and Testing

Once installation activities have been completed, Airbus DS Communications shall perform a Site Readiness inspection to validate System Installation Compliance, capturing any punch-list items. Any discrepancies, or issues, impacting system performance shall be resolved prior to proceeding with the Validation Stage.

1.1.5 Project Integration and Validation Stage

During the Project Integration and Validation stage, the radio network is fully optimized, validated and commissioned.

Major work activities taking place during the Integration and Validation Stage include:

- System Optimization
- Radio Coverage Acceptance Testing as part of the Coverage Acceptance Test Plan (CATP)
- Functional Acceptance Testing

Following successful validation of the radio network, Airbus DS Communications shall coordinate with the Lexington-Fayette Urban County Government the migration of the existing AVTEC Scout dispatch console positions from the LFUCG Police Headquarters and Fire Department locations to the Public Safety Operations Center on Cisco Road.

1.2 Schedule Assumptions

Major assumptions used in the development of the schedule are highlighted below:

- The proposed schedule is based upon a Contract Start date of August 3, 2015.
- All selected options are identified prior to the issuance of the Notice to Proceed. Should Lexington-Fayette Urban County Government request a priced option at a later date, Airbus DS Communications is prepared to discuss any resulting impacts to the schedule or pricing.
- Lexington-Fayette Urban County Government provides timely review and response to Airbus DS Communications submittals and correspondence.
- Lexington-Fayette Urban County Government performs all required tasks identified as its responsibility in the Share of Responsibility matrix identified in Section 2 on a timely basis. Specific schedule requirements are noted in Table 2 below.
- Lexington-Fayette Urban County Government resources will be available as required to stay on schedule. Lexington-Fayette Urban County Government will also support Airbus DS Communications reasonable request(s) to work past regular work hours with LFUCG personnel, if needed, in order to stay on schedule.
- Radio system users will be trained and ready for the P25 system at the time of cutover.
- Coverage testing will be dependent upon acceptable weather for driving.

Airbus DS Communications and the Lexington-Fayette Urban County Government will adjust the schedule due to events or factors that are outside of Airbus DS Communications control, including regulatory approvals, site construction, or weather delays. Airbus DS Communications will work with the Lexington-Fayette Urban County Government to establish a new project completion date. Airbus DS Communications reserves the right to reassign its resources for other purposes, including other projects, while waiting for any extended project delays (more than 14 calendar days) due to unforeseen events beyond Airbus DS Communications' immediate control that could extend the project timeline. Airbus DS Communications reserves the right to submit a change order due to the delay in project implementation timelines.

1.3 Project Key Milestone Dates

This section summarizes the proposed project milestone dates that will be used to signal the completion of key project deliverables and events. The first milestone of the proposed timeline is the Notice to Proceed with all other events referenced to the number of calendar days from this time, TO.

1.3.1 Milestone Dependencies

1. **Notice to Proceed:** Following contract execution, the Lexington-Fayette Urban County Government notifies Airbus DS Communications in writing the date to commence mobilization for the project
2. **Project Kickoff Meeting:** A meeting is scheduled between Lexington-Fayette Urban County Government and Airbus DS Communications to introduce the project teams and review the design parameters in accordance with contract requirements.

In order to maintain the proposed project schedule, Airbus DS Communications shall request acceptance of the battery backup solution for both the Public Safety Operations Center and Blue Grass Airport site locations at this time.

3. **Preliminary Design Review:** Airbus DS Communications initiates the Preliminary Design Review by presenting to the Lexington-Fayette Urban County Government the design parameters in accordance with contract requirements. Airbus DS Communications will issue the meeting minutes confirming the milestone completion. This begins the process between our teams to work towards the completion of the Final Design.

In order to maintain the proposed project schedule, Airbus DS Communications shall request acceptance of both the shelter and tower designs for the Public Safety Operations Center site at this time.
4. **Final Design Approved:** This milestone indicates completion of the Final Design and agreement with written notification from the Lexington-Fayette Urban County Government for Airbus DS Communications to proceed with the system production and commence the process for equipment orders to be placed. The acceptance of the Final Design marks the completion of this milestone.
5. **Regulatory & Environmental Complete:** This milestone indicates the completion of all regulatory and environmental approvals required to commence the applicable construction work at the Public Safety Operations Center site.
6. **Staging Build Begins:** Airbus DS Communications will present an inventory report to the Lexington-Fayette Urban County Government that the equipment for staging has been delivered to the staging facility.

7. **Factory Staging Complete:** Airbus DS Communications will notify the Lexington-Fayette Urban County Government once the staged equipment has been made ready for shipment to a Lexington-Fayette Urban County Government designated facility with a loading dock that is capable of properly offloading the equipment.
NOTE: Given that this proposal is for the expansion of an operational system in the field, customer witnessed Factory Acceptance Testing is not included as part of this project.
8. **Sites Ready for Installation:** Following the completion of the Site Preparation activities, including Shelter placement and Tower construction at the Public Safety Operations Center site, Airbus DS Communications will conduct a site walk to ensure that the site complies with applicable requirements and standards in preparation for equipment installation. Once all punch-list items from the site walk are resolved, the site shall be deemed ready for installation. Airbus DS Communications requests written notification from the Lexington-Fayette Urban County Government that installation activities may proceed for the Blue Grass Airport, WLEX, WVRB, Police Headquarters and Park Plaza sites.
9. **Site Installation Complete:** Once all equipment has been installed, Airbus DS Communications will perform site inspections together with Lexington-Fayette Urban County Government representatives and a punch-list will be generated. Completion of the punch-list items shall indicate completion of Site Installation and will commence the site provisioning, configuring and commissioning phase.
10. **Site Provisioning Complete:** Airbus DS Communications will submit an acceptance certificate upon completion of site provisioning and validation.
11. **Coverage Acceptance:** Airbus DS Communications will submit an acceptance certificate upon completion of the Coverage testing. Lexington-Fayette Urban County Government signoff will indicate acceptance.
12. **System Acceptance Complete:** Following the completion of Functional Acceptance Testing along with all service-impacting punch-list items, Airbus DS Communications will submit the System Acceptance Certificate to the LFUCG. This milestone shall indicate readiness for migration to commence of the Avtec Scout Dispatch consoles from the LFUCG Police Headquarters and Fire Department locations to the Public Safety Operations Center on Cisco Road.
13. **Final Acceptance:** Following the successful completion of the migration, Airbus DS Communications will submit the Final Acceptance Certificate.

Table 1 Project Milestone Dates

ID	Milestone	Calendar Ref.	Objective Date
1	Contract Execution Start / Notice to Proceed	T0	August 3, 2015
2	Project Kickoff Meeting	T0 + 7 days	August 10, 2015
3	Preliminary Design Review	T0 + 32 days	September 4, 2015
4	Final Design Approved	T0 + 53 days	September 25, 2015
5	Regulatory & Environmental Complete	T0 + 74 days	October 16, 2015
6	Staging Build Begins	T0 + 154 days	January 4, 2016
7	Factory Staging Complete	T0 + 204 days	February 23, 2016
8	Sites Ready for Installation	T0 + 191 days	February 10, 2016
9	Site Installation Complete	T0 + 255 days	April 14, 2016
10	Site Provisioning Complete	T0 + 269 days	April 28, 2016
11	Coverage Acceptance	T0 + 283 days	May 12, 2016
12	System Acceptance Complete	T0 + 303 days	June 1, 2016
13	Final Acceptance	T0 + 318 days	June 16, 2016

The following key activities, which are the responsibility of the Lexington-Fayette Urban County Government, are required to be fulfilled by the objective date in order for the proposed schedule to be maintained. Any delay in the delivery of these objectives may have a corresponding extension to the overall schedule.

Table 2 Lexington-Fayette Urban County Government Required Deliverables

ID	Deliverable	Calendar Ref.	Objective Date
1	Acceptance of the battery backup solution [Project Kickoff Meeting]	T0 + 7 days	August 10, 2015
2	Acceptance of the shelter and tower designs [Preliminary Design Review]	T0 + 32 days	September 4, 2015
3	Final Design Review Approval [Final Design Approved]	T0 + 53 days	September 25, 2015
4	Notice to Proceed for Site Construction (PSOC) [Regulatory & Environmental Complete]	T0 + 74 days	October 16, 2015
5	Notice to Proceed for Installation activities (all sites) [Sites Ready for Installation]	T0 + 191 days	February 10, 2016
6	FCC license Approved* (<i>see note below</i>)	T0 + 256 days	April 15, 2016
7	Notice to Proceed for Dispatch Migration	T0 + 305 days	June 3, 2016

* **NOTE:** Airbus DS Communications cannot radiate RF energy for the PSOC Site and upgraded BGA Site without the LFUCG having a current FCC License or a Special Temporary Authority (STA) from the FCC.

2 Share of Responsibility

This table defines the preliminary Scope of Responsibilities for Lexington-Fayette Urban County Government (LFUCG) and Airbus DS Communications (Airbus) during the different project implementation phases for the **VESTA Radio** solution infrastructure.

Table 3 Share of Responsibility

R: Responsible; S: Support Tasks	LFUCG	Airbus	Comments
Project Services			
Project Management	S	R	
System Design	S	R	
Equipment staging		R	VESTA Radio equipment only. Microwave Equipment will be deployed and tested in the field.
Training	R		Since no new models or configuration of equipment are being provided, no additional training is being proposed.
Move of the Avtec Dispatch Consoles	S	R	Airbus DS Communications shall perform the physical move of the Avtec Scout Dispatch consoles from the LFUCG PDHQ and FD to the PSOC as part of the Migration. Airbus DS Communications will work with the LFUCG to schedule any required outages around non-busy hours
Design Services			
VESTA Radio System Design	S	R	
RF Antenna System Design		R	For BGA and PSOC Sites only.
IP Addressing plan	S	R	The IP Addressing Plan will be an extension of the LFUCG & Airport IP Addressing Plan.
Radio frequency coordination and licensing approval	R	S	
Microwave Backhaul Design		R	
Microwave frequency coordination and licensing approval		R	Contingent upon FAA approval for use of the BGA tower for microwave
Equipment Power Requirements		R	For Airbus provided equipment only
Preliminary Design Review	S	R	
Final Design Review	S	R	
Civil Construction and Site Development			
Technical Site Survey	S	R	Airbus will coordinate with the LFUCG
Structural Analysis	S	R	Structural Analysis of the towers at BGA and

R: Responsible; S: Support Tasks	LFUCG	Airbus	Comments
			WLEX are included as part of this proposal. No other Structural Analysis is anticipated or included.
Power and Grounding Survey		R	
Assessment of Site Improvements	S	R	
Site Acquisition	R		
Regulatory filings and application (SHPO, NEPA, Cultural, etc.)	R	S	
Zoning applications	R	S	
Construction & Building permitting	R	S	
Site Development	S	R	PSOC site only. Site development includes the items as described in the lines below.
New Tower	S	R	PSOC site only
New Shelters		R	PSOC site only
New Generators, if required		R	PSOC site only
Backup Power (UPS/Battery)		R	For BGA and PSOC Sites only. The existing BGA backup power will be expanded from its current configuration through the addition of rectifiers, inverters and batteries to support the equipment being added to the site.
Electrical services	S	R	Airbus DS Communications shall supply electrical load requirements for the PSOC sites for Airbus provided equipment and provide services necessary to bring the electricity from the PSOC building to the deployed shelter
Environmental system	R		LFUCG provided and maintained HVAC to support operating temperature range from 0° to 50° C
Soil Remediation		R	At the PSOC Site only
Hardware/Software			
Core Network Infrastructure			
VESTA Radio P25 Software		R	
Network Controllers		R	No new controllers are required or included with this proposal. The current BGA Multicast Site Controller will become surplus after the BGA Site is converted to a 9-channel Simulcast Site and may be used as an LFUCG Spare.

R: Responsible; S: Support Tasks	LFUCG	Airbus	Comments
Base station repeaters		R	
Alarm Aggregator		R	PSOC site only
GPS frequency reference		R	PSOC site only
Equipment racks		R	19" 2-post equipment racks
Transmission Network			
Network Routers		R	
Network Switches		R	
RF Antenna Subsystem			
TX Combiners		R	
RF Power Monitors		R	PSOC site only
Antennas		R	
GPS Antenna & Mounts		R	PSOC site only
Tower Top Amplifiers		R	PSOC site only
Polyphasers		R	
RX Multicouplers		R	A new 24-channel RX Multicoupler shall be deployed at the BGA Site. The current BGA RX Multicoupler will become surplus after the BGA Site is converted to a 9-channel Simulcast Site and may be used as an LFUCG Spare.
RF Transmission lines		R	
RF Cabling		R	
Grounding kits		R	
Backhaul Hardware/Software			
Microwave Backhaul		R	Airbus DS Communications cannot radiate RF energy for the PSOC Site and upgraded BGA Site without the LFUCG having a current FCC License or a Special Temporary Authority (STA) from the FCC
Fiber Backhaul	R		Assumed to be provided by WindStream under contract to the LFUCG. WindStream circuits shall be comparable to the other circuits currently in place, such as at WVRB (i.e. supporting IP Multicast Traffic, etc.)
Field Installation & System Commission			

R: Responsible; S: Support Tasks	LFUCG	Airbus	Comments
Local warehousing of equipment	R		
P25 Equipment Installation	S	R	Airbus shall coordinate with LFUCG for site access
Power Plant installation		R	PSOC and BGA sites
DC Power system integration		R	PSOC and BGA sites
Antenna System Installation		R	Microwave Installation at the BGA and Cisco Rd. sites contingent upon FAA and FCC approval
GPS antenna system installation		R	PSOC site only
System Integration		R	Including integration of new nodes into the existing Solarwinds server
System Optimization		R	Airbus DS Communications cannot radiate RF energy for the PSOC Site and upgraded BGA Site without the LFUCG having a current FCC License or a Special Temporary Authority (STA) from the FCC
Dispatch Console Installation	S	R	Airbus shall coordinate with LFUCG the relocation of existing AVTEC Scout dispatch consoles from LFUCG PD HQ and FD Communications Center to the New PSOC Facility.
Site Acceptance Test Plan		R	
Site Acceptance Testing	S	R	PSOC and BGA sites
System Verification Testing			
Transmission Network Validation	S	R	LFUCG support is needed for the validation of the WindStream Infrastructure.
System optimization testing		R	Airbus DS Communications cannot radiate RF energy for the PSOC Site and upgraded BGA Site without the LFUCG having a current FCC License or a Special Temporary Authority (STA) from the FCC
Coverage Acceptance Test Plan	S	R	
Coverage Acceptance Testing	S	R	LFUCG to provide cars, drivers, and participants for coverage testing; limited to BGA and PSOC Simulcast Sites
Coverage Analysis		R	
Functional Acceptance Test Plan		R	
Functional Acceptance Testing	S	R	

R: Responsible; S: Support Tasks	LFUCG	Airbus	Comments
System Documentation			
System Design Drawings		R	
Network Equipment Configuration		R	
Technical Solution Design		R	
As-Built Documentation	S	R	

LFUCG PSOC Consolidation and BGA Upgrade Proposed Project Schedule

ID	Task Name	Duration	Start	Finish	Predecessors	August							September				October				November				December				January				February				March				April				May				June																														
						E	B	M	T	W	Th	F	S	E	B	M	T	W	Th	F	S	E	B	M	T	W	Th	F	S	E	B	M	T	W	Th	F	S	E	B	M	T	W	Th	F	S	E	B	M	T	W	Th	F	S	E	B	M	T	W	Th	F	S	E	B	M	T	W	Th	F	S	E	B	M	T	W	Th	F	S	E	B
0	LFUCG PSOC Consolidation & BGA Upgrade Project	210 days	Mon 8/3/15	Thu 6/16/16		◆ 8/3																																																																									
1	Notice to Proceed	0 days	Mon 8/3/15	Mon 8/3/15		◆ 8/3																																																																									
2	Project Delivery Schedule	210 days	Mon 8/3/15	Thu 6/16/16		◆ 8/3																																																																									
3	Planning & Design Stage	39 days	Mon 8/3/15	Fri 9/25/15		◆ 8/3																																																																									
4	Project Planning	10 days	Mon 8/3/15	Fri 8/14/15	1	◆ 8/3																																																																									
5	Mobilize the Project Team	3 days	Mon 8/3/15	Wed 8/5/15	1	◆ 8/3																																																																									
6	Customer Project Kickoff Meeting	1 day	Mon 8/10/15	Mon 8/10/15	5FS+2 days	◆ 8/3																																																																									
7	Site Assessments	3 days	Mon 8/10/15	Wed 8/12/15	5FS+2 days	◆ 8/3																																																																									
8	Place order for Battery Backup solution	3 days	Tue 8/11/15	Thu 8/13/15	6	◆ 8/3																																																																									
9	Planning Stage Complete	0 days	Fri 8/14/15	Fri 8/14/15	4,7,8	◆ 8/14																																																																									
10	Preliminary Solution Design	14 days	Mon 8/17/15	Thu 9/3/15	9	◆ 8/14																																																																									
11	Preliminary Design Review	1 day	Fri 9/4/15	Fri 9/4/15	10	◆ 8/14																																																																									
12	Place order for Shelter	3 days	Tue 9/8/15	Thu 9/10/15	11	◆ 8/14																																																																									
13	Place order for Tower	3 days	Tue 9/8/15	Thu 9/10/15	11	◆ 8/14																																																																									
14	Final Solution Design	2 wks	Tue 9/8/15	Mon 9/21/15	11	◆ 8/14																																																																									
15	Final Design Review	1 day	Tue 9/22/15	Tue 9/22/15	14	◆ 8/14																																																																									
16	Final Design Solution Approval	3 days	Wed 9/23/15	Fri 9/25/15	15	◆ 8/14																																																																									
17	Final Design Solution Approved	0 days	Fri 9/25/15	Fri 9/25/15	16	◆ 9/25																																																																									
18	Regulatory & Environmental Complete	0 wks	Fri 10/16/15	Fri 10/16/15		◆ 9/25																																																																									
19	Site Preparation (Cisco Road)	57 days	Fri 10/16/15	Mon 1/25/16		◆ 10/16																																																																									
26	Production Stage	90 days	Mon 9/28/15	Tue 2/23/16		◆ 10/16																																																																									
27	Procurement	55 days	Mon 9/28/15	Mon 1/4/16		◆ 9/29																																																																									
28	Finalize Project Equipment & Materials List	2 days	Mon 9/28/15	Tue 9/29/15	16	◆ 9/29																																																																									
29	Transfer to Procurement	0 days	Tue 9/29/15	Tue 9/29/15	28	◆ 9/29																																																																									
30	Equipment Ordered	3 days	Wed 9/30/15	Fri 10/2/15	29	◆ 9/29																																																																									
31	Subcontracts Completed	5 days	Wed 9/30/15	Tue 10/6/15	29	◆ 9/29																																																																									
32	Equipment Delivered	10 wks	Mon 10/5/15	Mon 1/4/16	30	◆ 9/29																																																																									
33	Factory Staging	35 days	Mon 1/4/16	Tue 2/23/16		◆ 1/4																																																																									
34	Staging Build begins	0 days	Mon 1/4/16	Mon 1/4/16	32	◆ 1/4																																																																									
35	VESTA Radio Equipment Staging	5 wks	Tue 1/5/16	Mon 2/8/16	34	◆ 1/4																																																																									
36	Factory System Provisioning & Testing	2 wks	Tue 2/9/16	Tue 2/23/16	35	◆ 1/4																																																																									
37	Factory Staging Complete	0 days	Tue 2/23/16	Tue 2/23/16	36	◆ 2/23																																																																									
38	Installation Stage	46 days	Wed 2/10/16	Thu 4/14/16		◆ 2/10																																																																									
39	Sites Ready for Installation	0 days	Wed 2/10/16	Wed 2/10/16	20,37FS-2 wk	◆ 2/10																																																																									
40	Equipment freight	2 wks	Wed 2/24/16	Tue 3/8/16	37	◆ 2/10																																																																									
41	Equipment Installation & testing	3 wks	Wed 3/9/16	Tue 3/29/16	40	◆ 2/10																																																																									
42	Site Readiness Inspection	2 days	Wed 3/30/16	Thu 3/31/16	41	◆ 2/10																																																																									
43	Site punch-list	2 wks	Fri 4/1/16	Thu 4/14/16	42	◆ 2/10																																																																									
44	Site Installation Complete	0 days	Thu 4/14/16	Thu 4/14/16	43	◆ 4/14																																																																									
45	Integration & Validation Stage	44 days	Fri 4/15/16	Thu 6/16/16		◆ 4/14																																																																									
46	System Integration	15 days	Fri 4/15/16	Thu 5/5/16		◆ 4/14																																																																									
47	Radio Network Commissioning	2 wks	Fri 4/15/16	Thu 4/28/16	44	◆ 4/14																																																																									
48	Site Provisioning Complete	0 days	Thu 4/28/16	Thu 4/28/16	47	◆ 4/28																																																																									
49	Coverage Assessment & Optimization	1 wk	Fri 4/29/16	Thu 5/5/16	48	◆ 4/28																																																																									
50	System Validation	18 days	Fri 5/6/16	Wed 6/1/16		◆ 4/28																																																																									
51	Coverage Acceptance	5 days	Fri 5/6/16	Thu 5/12/16		◆ 4/28																																																																									
52	Customer Acceptance Testing	1 wk	Fri 5/6/16	Thu 5/12/16	49	◆ 4/28																																																																									
53	Functional Acceptance	13 days	Fri 5/13/16	Wed 6/1/16		◆ 4/28																																																																									
54	Functional Acceptance Test Readiness	1 wk	Fri 5/13/16	Thu 5/19/16	52	◆ 4/28																																																																									
55	Functional Acceptance Testing	3 days	Fri 5/27/16	Wed 6/1/16	54FS+5 days	◆ 4/28																																																																									
56	System Acceptance Complete	0 days	Wed 6/1/16	Wed 6/1/16	55	◆ 6/1																																																																									
57	Cutover Readiness Review	0 days	Tue 5/3/16	Tue 5/3/16	56FF-1 mon	◆ 6/1																																																																									
58	As-built Documentation	0 days	Wed 6/15/16	Wed 6/15/16	56FS+2 wks	◆ 6/1																																																																									
59	Migration to PSOC	10 days	Fri 6/3/16	Thu 6/16/16	56FS+1 day	◆ 6/15																																																																									
60	Final Acceptance	0 days	Thu 6/16/16	Thu 6/16/16	59	◆ 6/16																																																																									

Project: LFUCG PSOC Consolidation & BGA Upgrade Project
Date: Mon 3/16/15

Task Split Milestone ◆ Summary Project Summary Deadline ↓ Progress



Lexington-Fayette Urban County Government

PSOC Consolidation & BGA Upgrade Options

Exhibit 2 – Microwave Design

March 20, 2015

Table of Contents

1.	Microwave Design	3
	Introduction	3
	Microwave Design	3
	Microwave Design Assumptions	5
	Microwave Site Details	6
	Microwave Path Clearance Plots	7

1. Microwave Design

Introduction

Airbus DS Communications has performed a Microwave Network modification for LFUCG which incorporates the new PSAP at Cisco Road into the existing LFUCG microwave ring. This proposed microwave ring modification was developed utilizing new and existing radio sites within LFUCG, in accordance with FCC and FAA regulations, and standard microwave engineering practices as detailed in *Kizer's Digital Microwave Communications*.

Microwave Design

Airbus DS Communications recommends the following solution consisting of the microwave links listed in Figure 1. The new links to be added to the existing microwave system are Cisco Road - WLEX, and Cisco Rd - Police Headquarters (PDHQ). The following link is to be decommissioned: WLEX - PDHQ.

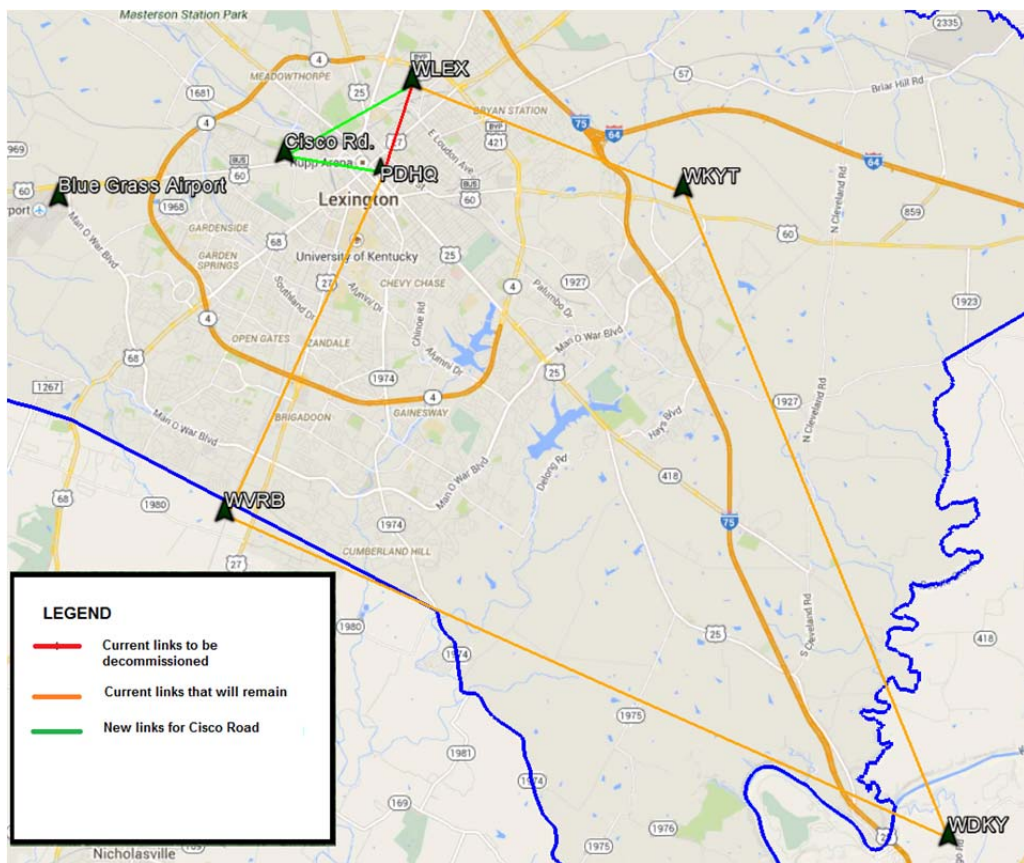


FIGURE 1 LFUCG MICROWAVE NETWORK

Microwave Design Assumptions

Frequency Bands

Both the 6 GHz and 11 GHz bands were considered for each new link.

Reliability

Each link was designed to a total rain+multipath reliability of 99.999%.

Software

The microwave design was performed using the Pathloss 5.0 microwave link design software. Pathloss is considered to be the industry standard microwave link design tool. The terrain files are based on the USGS National Map Database, and are NED (bare earth) format at a resolution of 10m. The land use/clutter files are NLCD-2006 (National Land Cover Database) land use files.

Path Clearance Criteria

The path clearance criteria for each microwave link is 100% clearance of the First Fresnel Zone plus an additional 10 feet. Using 100% clearance as opposed to the standard 60% will account for any tree/vegetation growth during the life of the microwave link. The Earth radius K factor was assumed to be 1.33.

Rain/Atmospheric Loss Models

The rain model used is Crane 2006 which utilizes public city rain data. The Crane rain model is considered the de facto standard for North America. The Crane D2 rain band was used for each microwave link design. The atmospheric attenuation regression coefficients are based on the ITU-R P.838.3 standard.

Multipath Fade Algorithm

The Vigants-Barnett reliability formula is used to calculate fades due to multipath and reflections. The Vigants-Barnett model was developed by Bell Labs and is the de facto standard for North America microwave link designs. The Vigants-Barnett model uses dispersive fade margin (DFM) for selective fading, and deep fade calculations for all fade margins.

Diffraction

The Deygout Algorithm was used to calculate knife-edge diffraction. The Deygout Algorithm separates obstacles into 'dominant' and 'subordinate' obstacles and applies a weight to each diffraction loss based on the magnitude of the obstacle. The total diffraction loss is a weighted sum loss of the dominant (also called main edge) and subordinate edges.

Climate Factor

Climate factor is used in reliability calculations and is based primarily from average temperature information. The NOAA lists the average temperature for Lexington as 53.08 degrees Fahrenheit. The C Factor used for each microwave link was 3.29.

1+1 MHSB Branching Loss

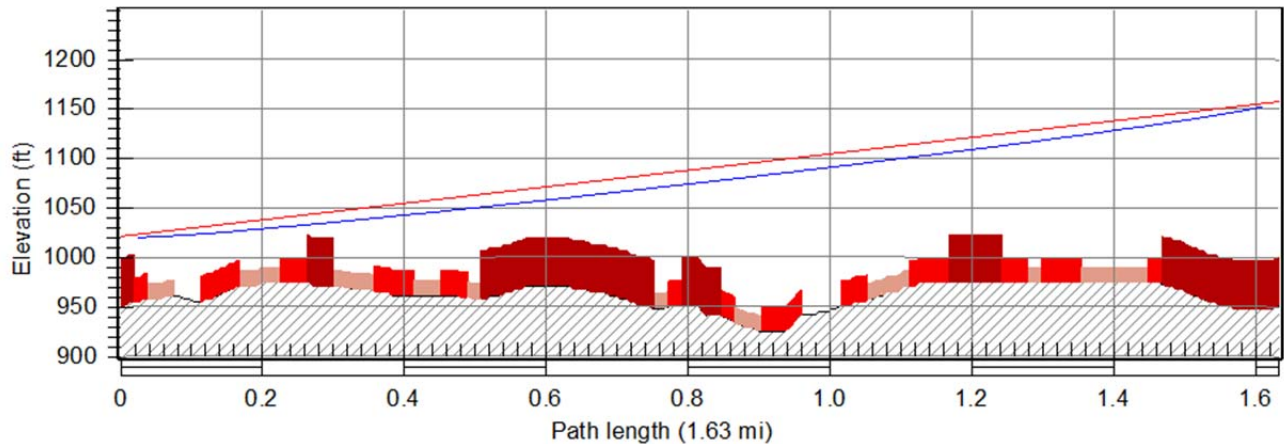
A branching loss of 1.6 dB was added to account for the 1+1 configuration of each microwave link.

Microwave Site Details

Site	Frequency Band	Radio Model	Antenna Model	Antenna Size	Antenna Height (ft)
Cisco Road-WLEX					
Cisco Road	6 GHz	Ceragon FibeAir R 1530 HP 11 GHz	VHP6-107	6'	80
WLEX	6 GHz	Ceragon FibeAir R 1530 HP 11 GHz	VHP6-107	6'	250
Cisco Road-PDHQ					
Cisco Road	11 GHz	Ceragon FibeAir R 1530 HP 11 GHz	VHP2-107	2'	70
PDHQ	11 GHz	Ceragon FibeAir R 1530 HP 11 GHz	VHP2-107	2'	203

Microwave Path Clearance Plots

Cisco Road to PDHQ

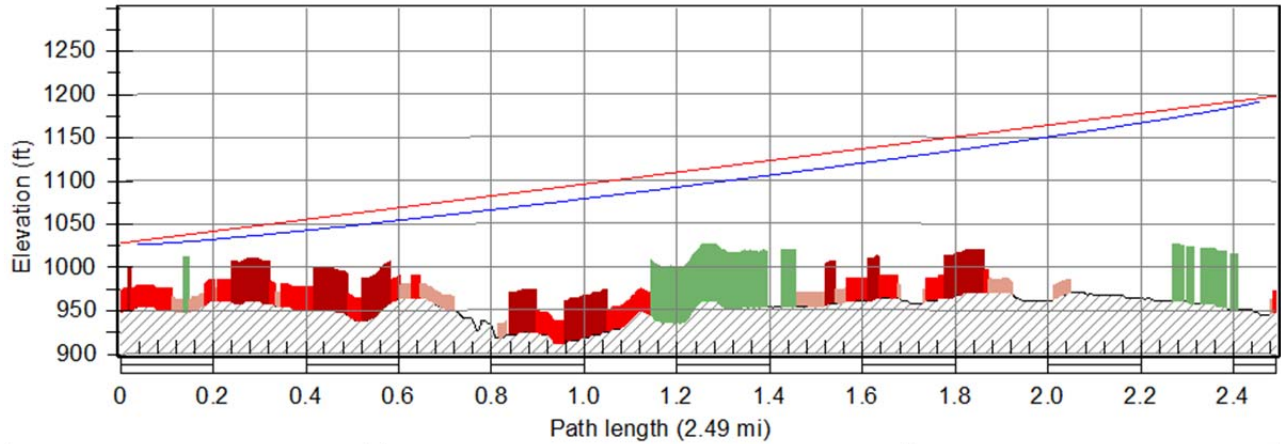


PSAP	
Latitude	38 02 52.65 N
Longitude	084 31 35.59 W
Azimuth	96.79°
Elevation	951 ft ASL
Antenna CL	70.0 ft AGL

Frequency (MHz) = 11000.0
K = 1.33
%F1 = 100.00

Police HQ	
Latitude	38 02 42.56 N
Longitude	084 29 48.58 W
Azimuth	276.81°
Elevation	951 ft ASL
Antenna CL	206.0 ft AGL

Cisco Road to WLEX



New PSAP	
Latitude	38 02 52.48 N
Longitude	084 31 36.57 W
Azimuth	60.44°
Elevation	948 ft ASL
Antenna CL	80.0, 80.0 ft AGL

Frequency (MHz)	= 11000.0
K	= 1.33
%F1	= 100.00

WLEX	
Latitude	38 03 56.60 N
Longitude	084 29 13.50 W
Azimuth	240.47°
Elevation	948 ft ASL
Antenna CL	250.0, 250.0 ft AGL



Lexington-Fayette Urban County Government

PSOC Consolidation & BGA Upgrade Options

Exhibit 3 – Coverage Acceptance Test Plan

March 20, 2015

Table of contents

1.	Introduction	3
	Test Objectives	3
	Overview of Testing Procedure	3
2.	Process	4
	CATP Global Process	4
	Prerequisites of the CATP Process	4
	Equipment	6
3.	Methodology	7
	Channel Performance Criterion (CPC)	7
	Reliability	8
	Determining the Required Number of Test Grids in the Coverage Area (Outdoor Only)	9
	Service Area	11
	Drive Test Equipment Set-up	13
	Drive Test BER Execution	14
	Determining Pass/Fail of the CPC Requirement	15
4.	Documentation	18
5.	Tiles and Drive Route	19
6.	CATP Acceptance	23
7.	Coverage Acceptance	24

1. Introduction

Note: The term Customer is used in this document to refer to the Lexington-Fayette Urban County Government (LFUCG) and Lexington-Fayette Urban County Airport (Airport).

The purpose of this RF Coverage Acceptance Test Plan (CATP) is to demonstrate the RF system performance of the P25 800 MHz Trunked Simulcast Digital Radio solution meets specified criteria for coverage and Delivered Audio Quality (DAQ). Compliance for required in building coverage will be accounted for in the automated testing. DAQ circuit merit testing will only be performed in tiles that do not pass automated testing. If the automated testing shows that the system passes the simulcast coverage guarantee, then no DAQ circuit merit testing will be performed. The test plan will include automated testing by Airbus DS Communications personnel and witnessed by representatives of the Customer and will include tests specific to the requirements in the RFP document for the system design.

Test Objectives

Using TIA/EIA TSB-88-C as a guideline, the test objectives for the coverage verification consist of:

≥ 95% of the defined service area coverage (all of LFUCG) for portable operations with a minimum DAQ3.4 @ 2% BER assuming a building penetration loss of no more than 10 dB

Overview of Testing Procedure

NOTE: If Portable In-Building testing passes automated testing Airbus DS Communications assumes mobile coverage testing to pass. If Portable In-Building testing passes automated testing Airbus DS Communications assumes that no DAQ circuit merit testing will be required.

To perform on street portable at the hip testing Airbus DS Comm will:

Utilize a drive test vehicle equipped with automated data collection equipment,

Apply attenuators corresponding to the correction factors necessary to simulate portable on the hip operations, the specific setup is discussed further in section 3.5 Drive Test Equipment Set-up

Apply 10 dB attenuator to the portables which corresponds to the In-Building penetration loss requirement

Apply attenuation as needed to the automated test equipment to compensate for link budget imbalances (the exact padding required will be finalized after site optimization has been performed)

Drive throughout the service area collecting BER, RSSI levels with the associated GPS data for the drive route

Perform DAQ/Circuit Merit testing in each tile that fails the automated test. The DAQ test would be between a portable with the external 10 dB attenuator in the field and a dispatch console

Process the data acquired and convert it to a usable format

These tests measure the audio quality through Bit Error Rate (BER) measurements and demonstrate whether the audio quality meets or exceeds the DAQ standards specified for this project. At the conclusion of verification testing, if DAQ quality standards are not met, a modification plan to bring performance within specified levels will be proposed.

2. Process

CATP Global Process

The CATP focuses on the performance as well as service level defined in the RFP. The process consists of the following tasks:

Analysis of the network performance and parameters

Optimization of network performance based on performance testing results*

Development of the Drive Test Routes

Performance drive tests

Analysis of the measurements and tests results

Formal reporting of the drive test results

* Network optimization is not part of the drive testing and requires the site configuration to be complete and the site acceptance performed. The analysis of the results will lead to network optimization recommendations, if necessary.

Prerequisites of the CATP Process

INITIAL INFORMATION

Prior to the execution of the coverage testing the detailed network configuration, as it pertains to radio engineering, must be reviewed by Airbus DS Comm Radio Network Engineering and the system confirmed as ready to test.

- System Key
- Frequency Plan
- Repeater/System alarm status

Prior to commencement of drive testing all sites within the drive test area must be verified as working properly, alarm free, and configured in accordance with the system design parameters.

DEDICATED TEST TALKGROUP

A dedicated test Talkgroup shall be provided for use during the coverage acceptance testing and configured to allow operation throughout the coverage area under test. This Talkgroup shall additionally be used for circuit merit testing performed during the acceptance testing. Because of the size of LFUC, two (2) drive teams will be utilized for the automated Coverage Acceptance Test. A channel will be partitioned for exclusive use for the BER and RSSI drive testing.

HUMAN RESOURCES

NOTE: It is dangerous and illegal in many areas to drive a vehicle and operate a computer at the same time. It is for this reason no drive testing is permitted by Airbus DS Comm personnel without a dedicated driver and a dedicated equipment operator present in the vehicle.

Table 1 Required Human Resources

Personnel per Test Team	Organization	Responsibility/Function
Test Engineer	Airbus DS Comm	Execute the CATP. Data Collection and drive route navigation
Driver	LFUCG	Operation of the motor vehicle during the drive test
Witness	LFUCG	Witness the drive testing is executed in accordance with the CATP
Technical Solution Engineer	Airbus DS Comm	Airbus DS Comm representative on the Monitor team and as required during testing.
Console Operator	LFUCG	LFUCG representative on the Monitor team during circuit merit testing

Equipment

Airbus DS Communications shall provide the equipment in Table 2 for the execution of the Drive Test. Due to variations in test and peripheral equipment, Airbus DS Comm has developed a standard equipment configuration for the execution of the drive testing. Use of alternative test or peripheral equipment shall not be allowed.

Table 2 Equipment

Equipment per Test Team	Provided By	Function
Test Vehicle	LFUCG	
Navigation Computer	Airbus DS Comm	Necessary for drive route navigation
STI-9400 or equivalent	Airbus DS Comm	RSSI Data Collection and Location Tracking
Test Computer	Airbus DS Comm	Data Storage
Tait TM9155	Airbus DS Comm	RSSI and BER data collection
Quarter Wave Magnetic 2 dBi (0 dBd) antenna	Airbus DS Comm	RSSI Signal Acquisition
Attenuator Kit	Airbus DS Comm	necessary to simulate portable on hip/in building operations
Portable Radio with 10 dB attenuator to simulate Building Loss	LFUCG	Necessary for circuit merit calls if required
Tool Kit	Airbus DS Comm	

3. Methodology

The CATP is used by Airbus DS Communications to verify the performance of RF coverage for public safety land-mobile radio systems. It is based on the signal strength measurement method and provides an accurate, statistically valid, repeatable, objective, and cost-effective method to demonstrate compliance with the coverage requirements of a wireless network.

The methods described in this CATP comply with Bulletin TSB-88-C, Wireless Communications Systems – Performance in Noise and Interference-Limited Situations - Recommended Methods for Technology-Independent Modeling, Simulation, and Verification, published by the Telecommunications Industry Association (TIA).

TSB-88-C defines Channel Performance Criterion (CPC) as the probability of achieving the desired DAQ/BER over the defined service area. TSB-88-C defines a service area as the boundary of a specific user's geographic bounded area of concern. Usually a political boundary such as a county line, limit, or similar definition for the user's business can be defined relative to site coordinates or an irregular polygon where points are defined by latitude and longitude. TSB-88-C states that service area reliability shall be verified using tile-based area reliability for all tiles within the service area. TSB-88-C also states that validated service area reliability shall be determined by the percentage of test locations that meet or exceed the specified CPC.

Channel Performance Criterion (CPC)

The CPC is the specified minimum design performance level in a faded channel. For this system, the CPC is a Delivered Audio Quality of DAQ3.4 @ 2%BER for portable operations. The Delivered Audio Quality Definitions are stated in Table 3 below.

Table 3 Delivered Audio Quality Definitions

Delivered Audio Quality (DAQ)	Grade of Circuit Performance
1	Unusable. Speech present but unreadable.
2	Understandable with considerable effort. Frequent repetition due to Noise/Distortion.
3	Speech understandable with slight effort. Occasional repetition required due to Noise/Distortion.
3.4	Speech understandable with repetition only rarely required. Some Noise/Distortion.
4	Speech easily understood. Occasional Noise/Distortion.
4.5	Speech easily understood. Infrequent Noise/Distortion.
5	Speech easily understood.

Reliability

The reliability is the percent of locations within the service area which meet or exceed the specified CPC Delivered Audio Quality (DAQ).

Coverage reliability is verified by sampling a statistically significant number of randomly selected locations, quasi-uniformly distributed throughout the service area. For service area reliability, all tested tiles are included. Location information collected during testing will be used to remove any tiles not included in the specified service area.

This CATP describes the covered area reliability technique. Specific detail on the number of tiles needing to be tested, and the percentage of tiles needing to pass the test to meet the coverage requirement follows. The automated RSSI/BER testing will be the determining factor for coverage acceptance.

For this test:

> DAQ3.4 @ 95% of the portable at the hip, 10 dB In Building penetration loss throughout LFUCG.

The method of determining the coverage criteria is as follows:

Where:

T_p = Total of tiles passed

T_t = Total of tiles tested

Where:

$T_p/T_t \times 100 \geq 95\%$ is considered a successful test

Determining the Required Number of Test Grids in the Coverage Area (Outdoor Only)

TEST GRID SIZE

Outdoor – The minimum test grid size is 100 wavelengths by 100 wavelengths; however, the minimum practical grid size is typically about 200 by 200 meters (about 0.124 by 0.124 miles). The maximum test grid size is 2 km by 2 km (1.25 by 1.25 miles). In some wide-area systems, this constraint on maximum grid size may dictate a greater number of test grids than the minimum number required by the Estimate of Proportions formula.

According to the Lexington-Fayette Urban County Government, KY, "Trunked Radio System Request for Bids" document, Section 3.1.3, the document states, "...the submitters will optimize the system design to provide the best possible radio coverage for portable units in light (10 dB) buildings throughout the design bounded area - the entire Lexington-Fayette Urban County.). This area is defined as Zone A, and Zone B. According to Section 3.1.3 of the above referenced document, "The outside zone ("Zone A") covers the rural area of LFUCG.", and "The middle zone ("Zone B") covers the residential and commercial areas of Lexington."

In Section 3.4, the document states, "The sizes of the test grids will be approximately 1/2 mile by 1/2 mile for Zone A, 1/4 mile by 1/4 mile for Zone B..."

The test grids for this Coverage Acceptance test will be defined as follows:

LFUCG Zone A – 0.25 mi² per tile or 0.5 miles on a side. 858 tiles.

LFUCG Zone B - 0.0625 mi² per tile or 0.25 miles on a side. 1491 tiles

LFUCG will have 2349 total test tiles.

TEST GRID ACCESSIBILITY

Prior to testing and during the test, Airbus DS Communications in cooperation with the Customer will determine if any grids are inaccessible for coverage testing due to a lack of roads, land restrictions, or being water, etc. Airbus DS Communications and LFUCG have agreed to eliminate inaccessible grids from the calculation if enough grids are available to meet the minimum required number of grids to present statistically significant sample.

MEASUREMENTS IN EACH GRID

Coverage verification using a combination of BER and carrier power is the method preferred by Airbus DS Communications since this technique provides the most meaningful data in determining whether or not the system meets its coverage objectives. Interference can distort the carrier power reading, causing the measured value to be higher than the value of the wanted signal. BER measurements are collected using receivers designed for this purpose. The digital 1-0-1-1 test pattern is recommended by TSB-88-C and APCO Project 25.

The sample distance (D) for outdoor test route measurements of the local median received signal power in a test tile should be $28\lambda \leq D \leq 100\lambda$. The test tile size is 0.5 miles x 0.5 miles. Airbus DS Communications prefers to use a distance of 40λ as this smoothes the Rayleigh fading while avoiding changes due to location variability.

Bit Error Rate measurements may require longer distances or time intervals to collect the required number of test sub-samples. RF coverage verification involving BER measurements shall be made over 1 second or 40m, whichever is greater.

For outdoor testing, the number of sub-samples taken for each sample to measure the median power in each tile shall be 122. When measured over a distance of 40m, multiples of 122 sub-samples are preferred to obtain maximum de-correlation of signal level measurements. This results in a confidence interval of 99% that the measured value is within ± 1 dB of the actual value. Other values of test sub-sampling rates or confidence intervals may be used as needed, and where used, the sub-sampling rates shall be computed in accordance with TSB-88-C.

Service Area

The defined service area is the entire area of Lexington-Fayette Urban County. See Figures 1 and 2.

Figure 1 Zone A Service Area

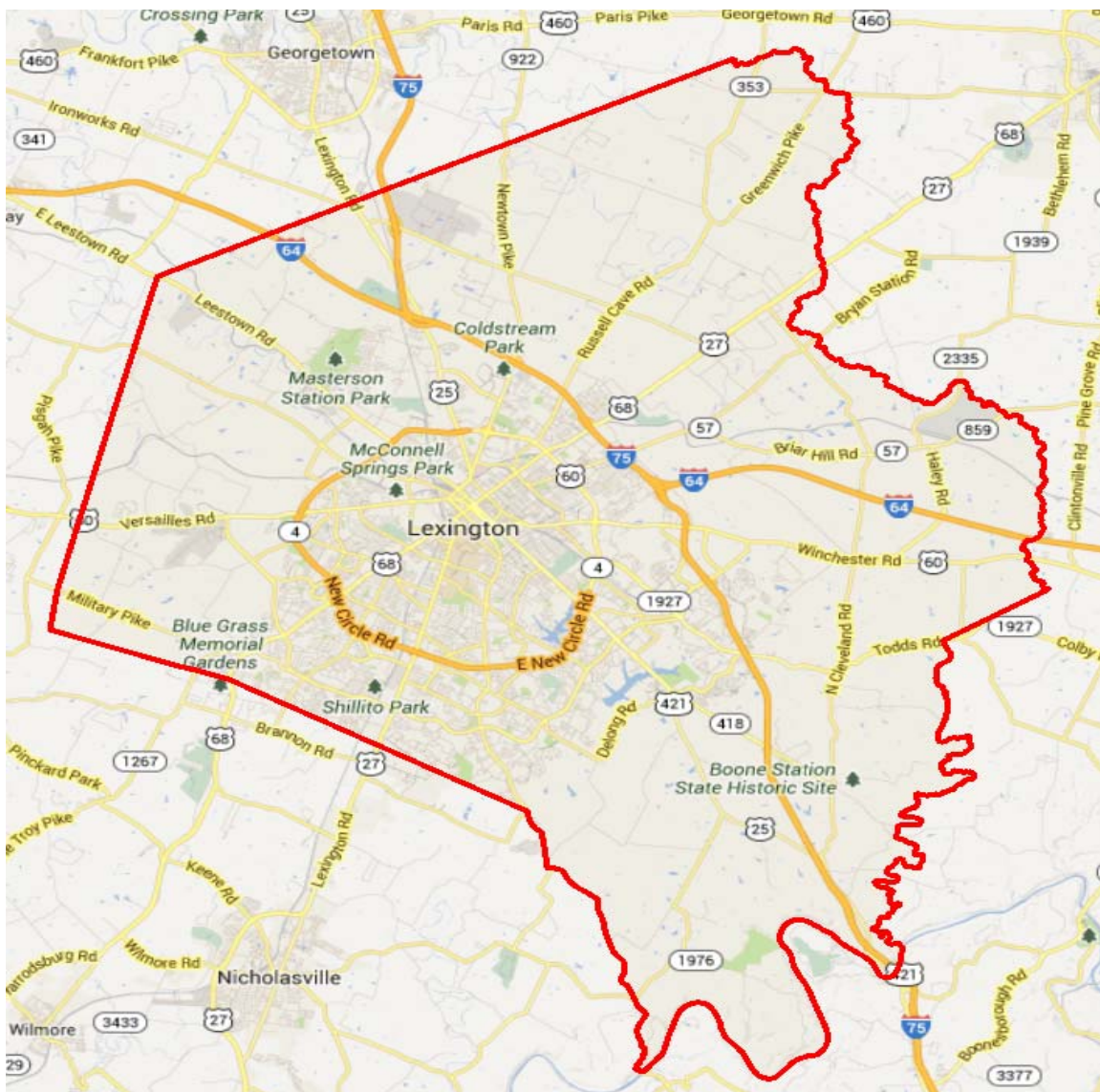
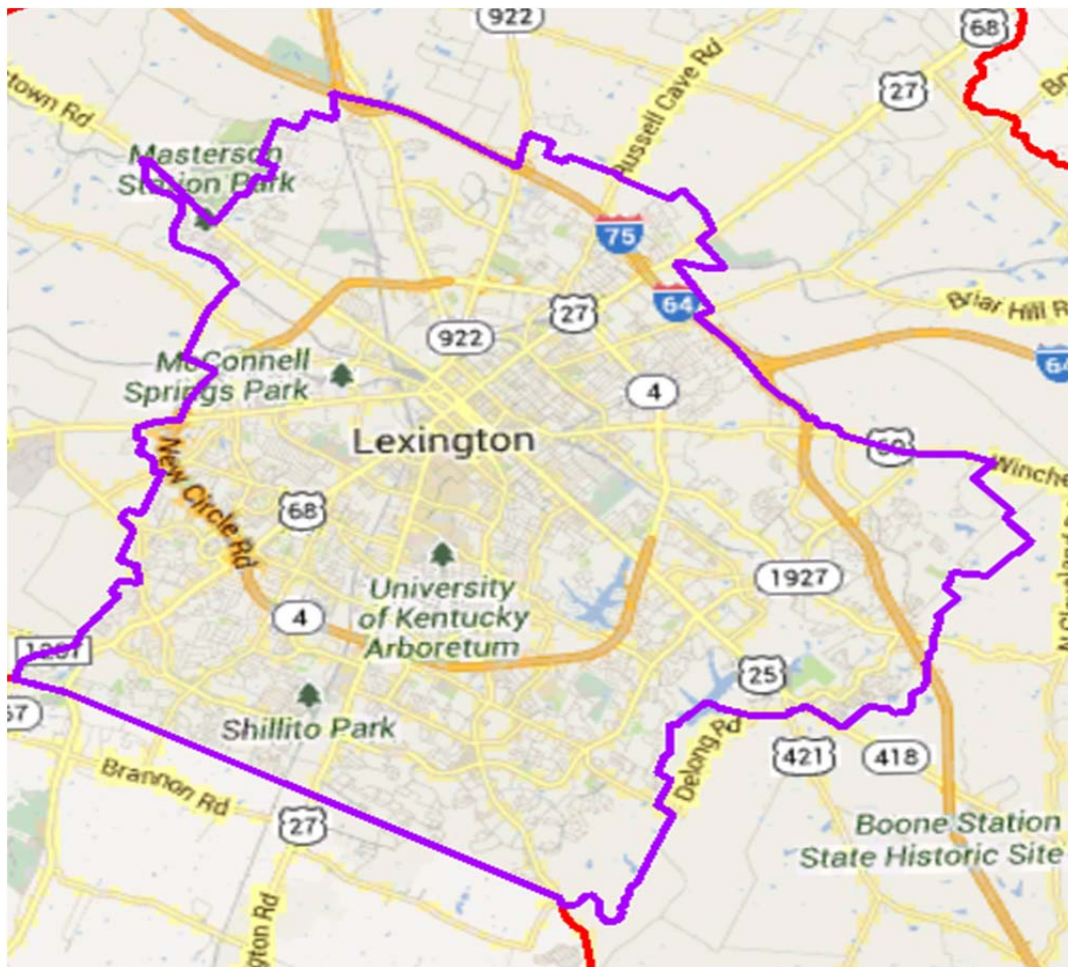


Figure 2 Zone B Service Area



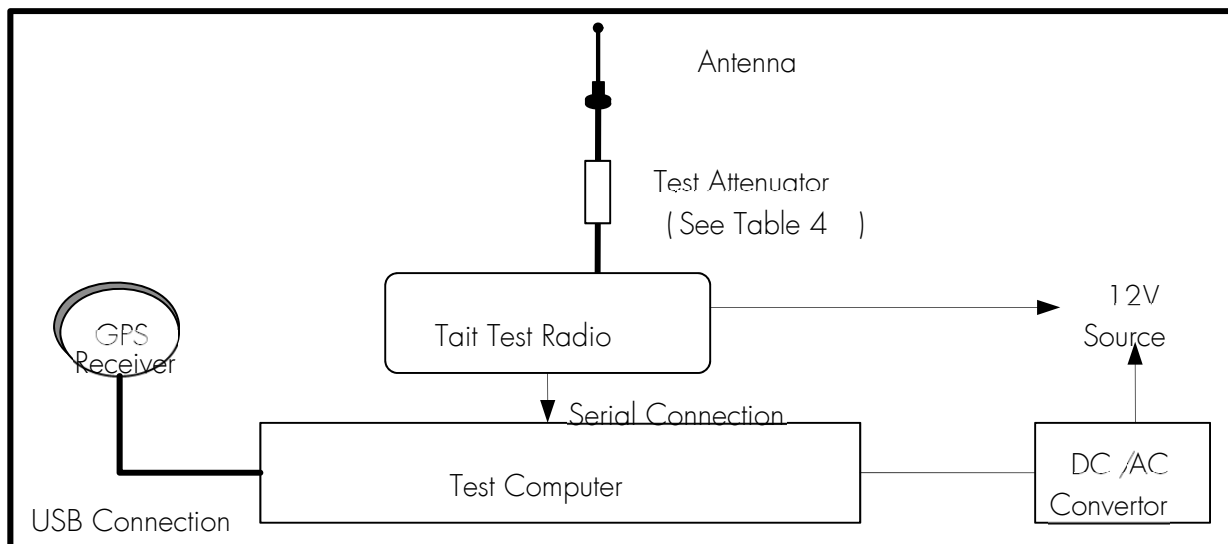
Drive Test Equipment Set-up

The drive test equipment will be configured in accordance with the manufacturer’s guidelines and the applicable Airbus DS Comm standard procedure. The Portable radio body losses and antenna correction factors, for outdoor and indoor operations, will be simulated through the use of attenuators introduced to the antenna system of the Tait TM9155 test radio. See Table 4.

Table 4 Operational Testing Antenna System Correction Factors

Operation Under Test	Test Antenna System Attenuation			Required BER Threshold	Required DAQ Threshold
	Body Loss	In-Building Loss	Total Attenuation		
Portable In Building	10.0 dB	10.0 dB	20.0 dB	≤ 2%	3.4

Figure 3 Simulated Operation Equipment Set-Up



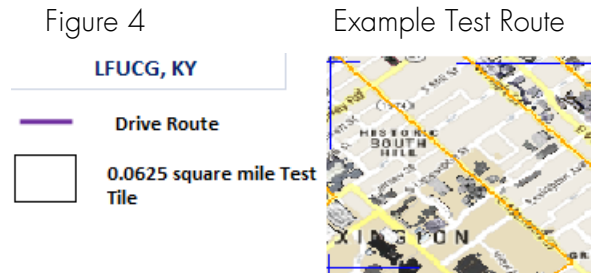
Drive Test BER Execution

The test vehicle will need to collect data throughout all accessible tiles of the entire Service Area;

Ensuring to collect a minimum of 122 sub-samples per tile

To the maximum possible extent evenly distribute samples within each tile

The typical test route for LFUCG is to bisect the test tile. The test routes have been determined and if necessary will be adapted during the drive test if necessary. An example is provided below:



Along the drive test routes:

The computer connected to a mobile test radio and to a GPS receiver will continuously acquire BER measurements of the cell the terminal is registered in and stamp the recorded BER with the geographical coordinates of the measurement.

Determining Pass/Fail of the CPC Requirement

BER MEASUREMENTS PORTABLE ON-STREET

Measurements shall be taken using automatic data collection equipment mounted in a vehicle similar to the ones used by LFUCG. The automated data collection equipment performs the subsample tests within each grid, logging the data. This equipment, additionally, maps the measurement data using GPS technology. The grid is determined to have passed should the result of the subsample tests within the grid be equal to or greater than the required thresholds defined in the contract agreement. Refer to Table 5 for the definition of the testing criteria.

Operation	Under Test	Required BER Threshold	Required DAQ Threshold
	Portable In Building	≤ 2%	3.4

DELIVERED AUDIO QUALITY (DAQ) TEST (CIRCUIT MERIT)

DAQ testing will be performed only in tiles that fail automated testing. The DAQ test is a subjective pass/fail evaluation of the audio transmissions. These are typically based on team consensus of the test transmissions as compared to the Channel Performance Criteria stated above.

The test team performs a stationary talk-out/talk-back test using a portable radio and antenna equipment while communicating with the dispatchers or other monitor team personnel. The audio quality is then rated and the result is recorded in the DAQ data sheet.

A location must be rated as having a DAQ of 3.4 or better to be considered a PASS. If a test point is rated less than DAQ 3.4, the tester may move anywhere within 1-2 meters (roughly 3-6 feet) of the original test point and repeat the test. If the second attempt is successful, then the test point is deemed a PASS. A count will be kept of Second Attempts / Retries.

TSB-88 Section 5.6.3.2 states: "If a static test is employed, and a given location test fails to meet the specification, it is recommended that the test team move 1-2 meters (roughly 3-6 feet) from the original location and repeat the test. Passing the second test constitutes passing that test location."

DAQ TEST EXECUTION

In the event of a DAQ test, one (1) DAQ test call with a Portable will be performed at each test location, providing the location ID during the speech (mandatory to identify each test call). DAQ will be tested for both talk-in and talk-out (Portable to Dispatch, and Dispatch to Portable). The Portable will be worn at the waist level (3.3'/1m) and operated utilizing an external microphone when performing a test. The location of the test call shall follow the next instructions:

While in the vehicle: a successful test call (inbound and outbound) would then validate the tile outdoor

Outside vehicle if the previous test is deemed a failure: a successful test call (inbound and outbound) would then validate the tile for outdoor.

DAQ test calls sheets (sample is shown in Table 6 DAQ Test Call Record Example) will be provided to field test team(s) and to the Dispatch operator, containing the location or Tile ID, the accessibility of the location (as assessed by field test team), and the result of the DAQ test call:

PASS (1) if DAQ \geq 3.4

FAIL (0) if DAQ < 3.4

Typical speech sequence for each circuit merit call shall be initiated by the field test team, and as follows:

Field test team #1 initiates call: "Field test team #1 to Dispatch operator, location B7, indoor environment, how do you receive me?"

Dispatch operator answer: "Dispatch operator to Field test team #1, location B7, indoor environment, Talk Back call test is PASS. And you, how do you hear me?"

Field test team #1: "Field test team #1 to Dispatch operator, location B7, indoor environment, Talk Out call test is PASS"

Each party then reports the test result on their test sheet.

In the event that the first test call (inbound or outbound) is unsuccessful, the field team will be allowed to move up to 1-2 meters (roughly 3-6 feet) and test again. If the second attempt is unsuccessful then the test location will be considered a failure. All retries will be counted; however no more than 5% of the total retries will be allowed in determining a successful test. A count will be kept of Second Attempt / Retries.

Table 6 DAQ Test Call Record Example

Tile Number	DAQ Test Result	
	Talk Out (TU to Disp)	Talk Back (Disp to TU)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

TU = Test Unit

- A rating of 1 indicates a PASS
- A rating of 0 indicates a FAIL

4. Documentation

Airbus DS Comm submits to the Customer a report detailing the coverage test results. This report includes a form, which is to be signed by the Customer and Airbus DS Comm, indicating that the test was performed in accordance with this CATP, and the results of the test indicate the acceptance or non-acceptance of the coverage portion of the system. The Customer has the option of accepting the coverage at any time prior to completion of the coverage test or documentation process.

In addition during any subjective DAQ testing (only used if the automated BER/RF Signal Strength test fails in any given tile as stated above), a test log is kept by each test team—mobile and at the control point as stated previously. The pass/fail evaluations for each test tile are recorded on the test logs. Airbus DS Comm evaluates both the automated and subjective test logs (if applicable) to determine whether the coverage test was passed for the equipment configuration under test. A copy of the test logs is provided to the Customer at the conclusion of the coverage test along with all other CATP documentation.

5. Tiles and Drive Route

The maps below reflect the tiling layout for LFUCG, KY and the proposed drive route within the tiles. See Figures 5 through 8. Drive routes will also be provided in an electronic format for detailed review.

Figure 5 Zone A Test Tiles (with Zone B darkened)

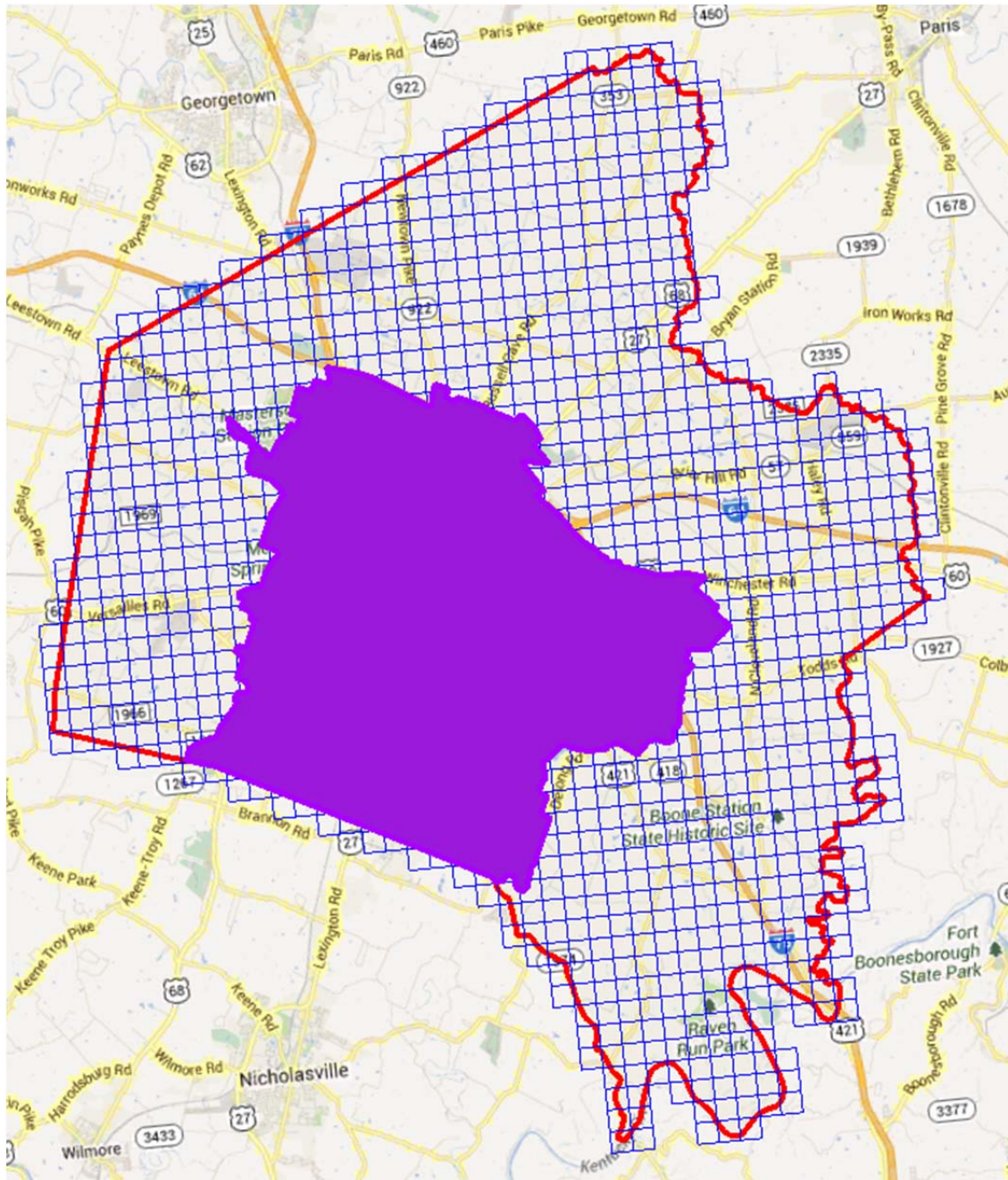


Figure 6 Zone A Drive Route

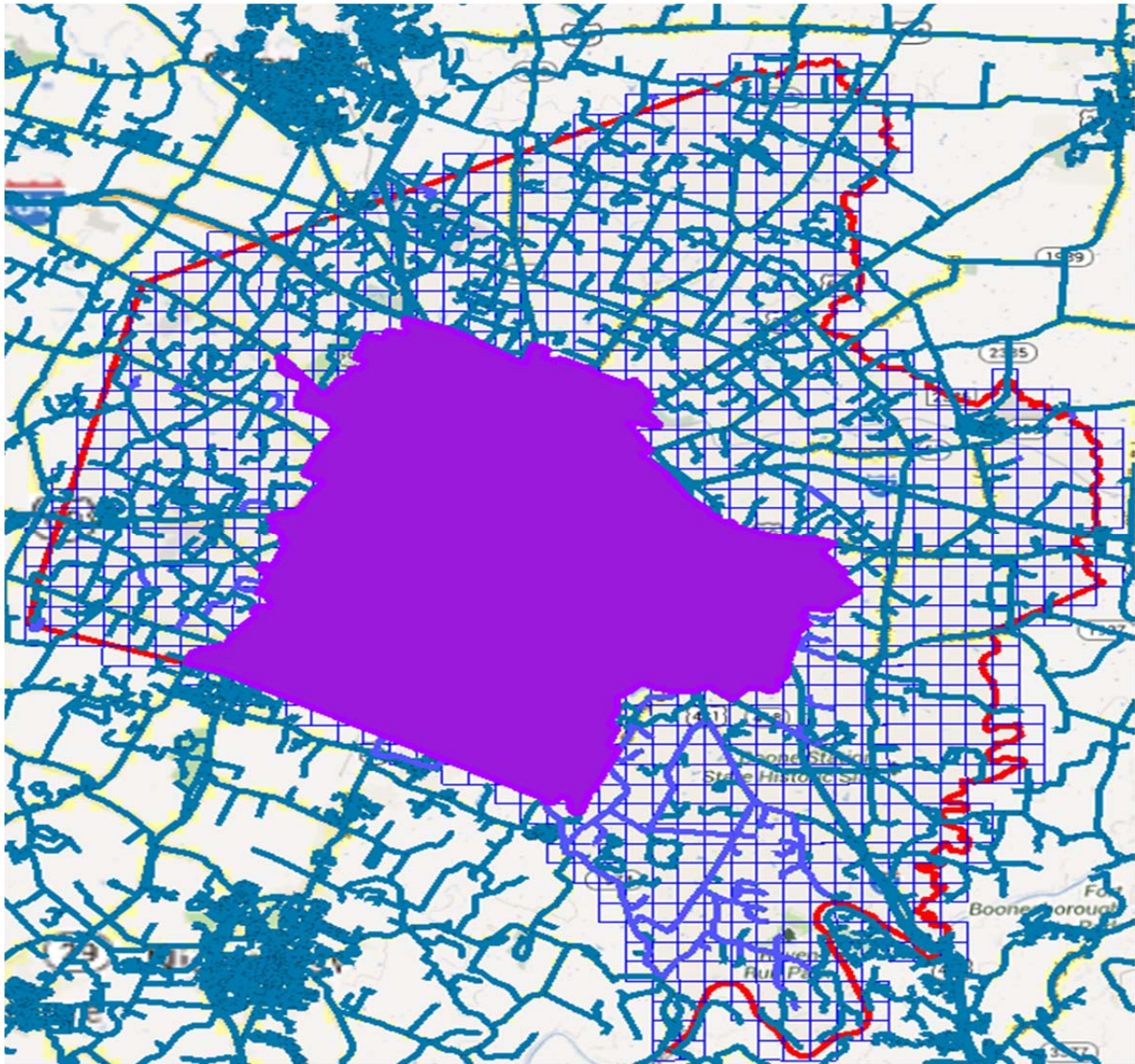


Figure 7 Zone B Test Tiles

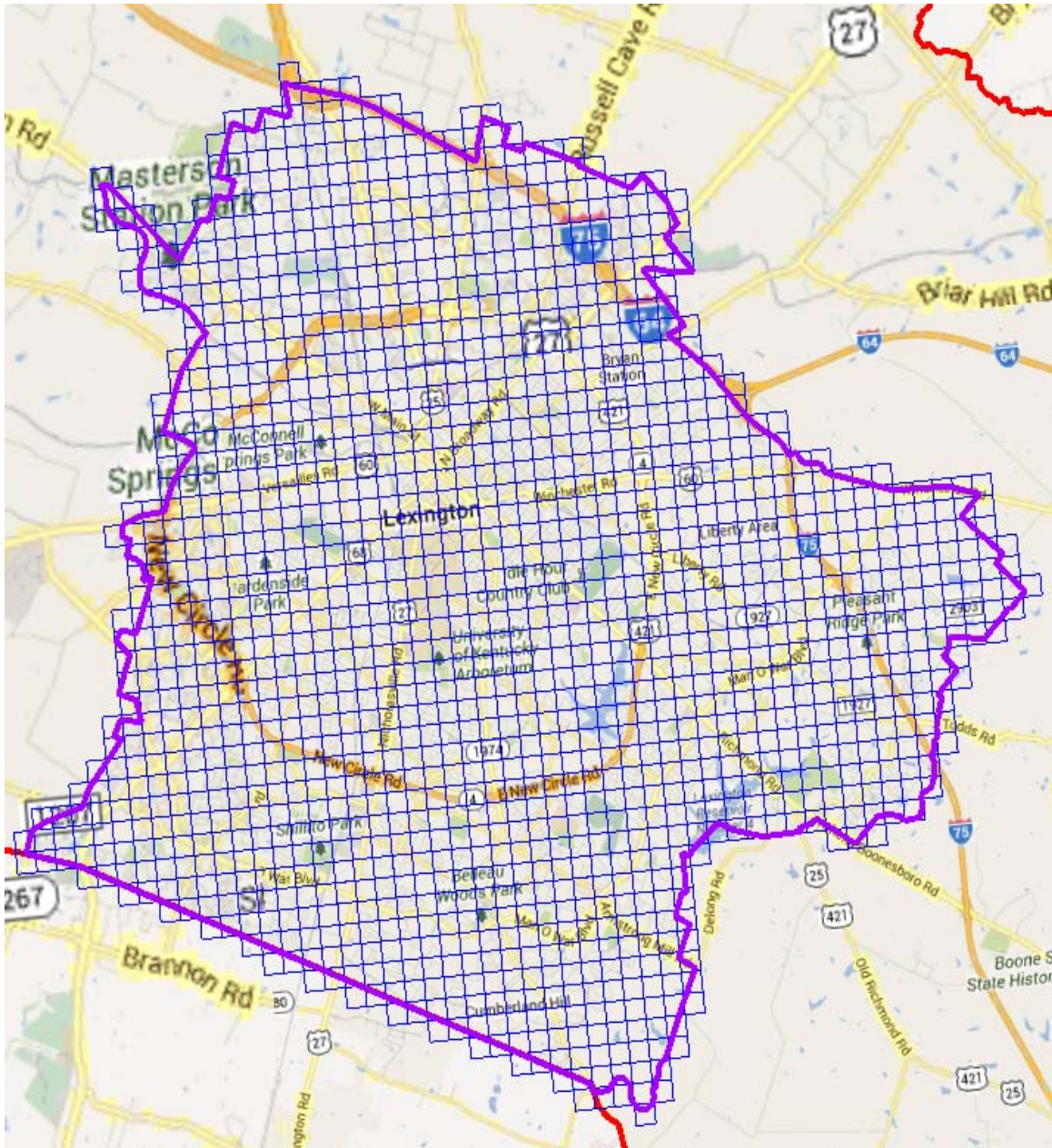
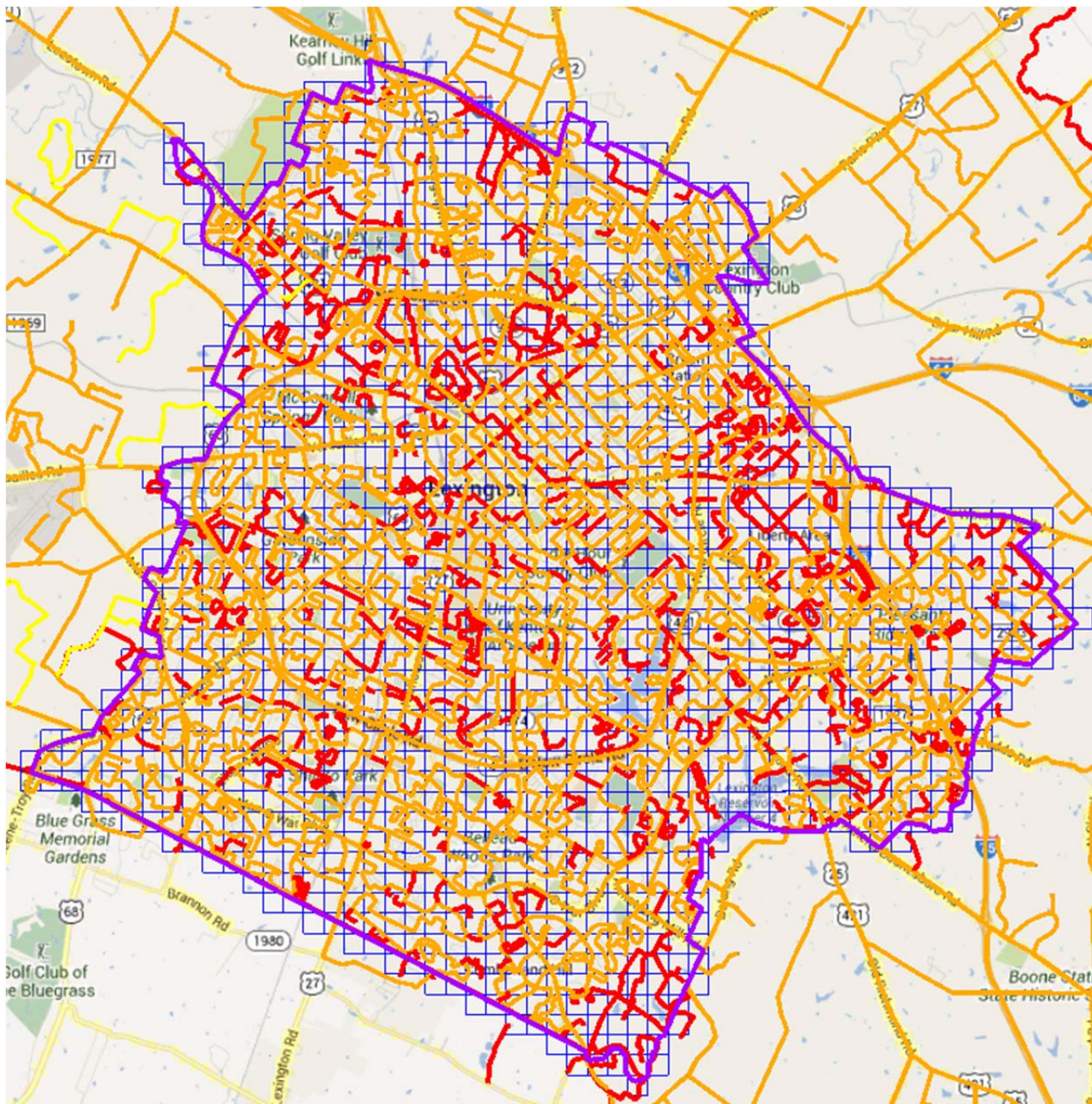


Figure 8 Zone B Drive Route



6. CATP Acceptance

This Coverage Acceptance Test Plan has been read and approved for use as indicated by the signature below:

LFUCG Representative	Airport Representative	AIRBUS DS COMM Representative
Signature	Signature	Signature
Printed name and title	Printed name and title	Printed name and title
Date	Date	Date

7. Coverage Acceptance

Based upon the successful completion of the Coverage Acceptance Test Plan, LFUCG and Airport hereby:

Grants Coverage Acceptance.

LFUCG Representative	Airport Representative	AIRBUS DS COMM Representative
Signature	Signature	Signature
Printed name and title	Printed name and title	Printed name and title
Date	Date	Date



Lexington-Fayette Urban County Government

PSOC Consolidation & BGA Upgrade Options

Exhibit 4 – System Diagrams

March 20, 2015

LFUCG
Deployment of the New PSOC (Public Safety Operations Center)

PRELIMINARY

Assumptions / Notes / Purpose:

Legend

Title: **LFUCG Deployment of the New PSOC**

Project: **LFUCG Deployment of the New PSOC**

Version: 0.3

May 18 2015

Preliminary Final

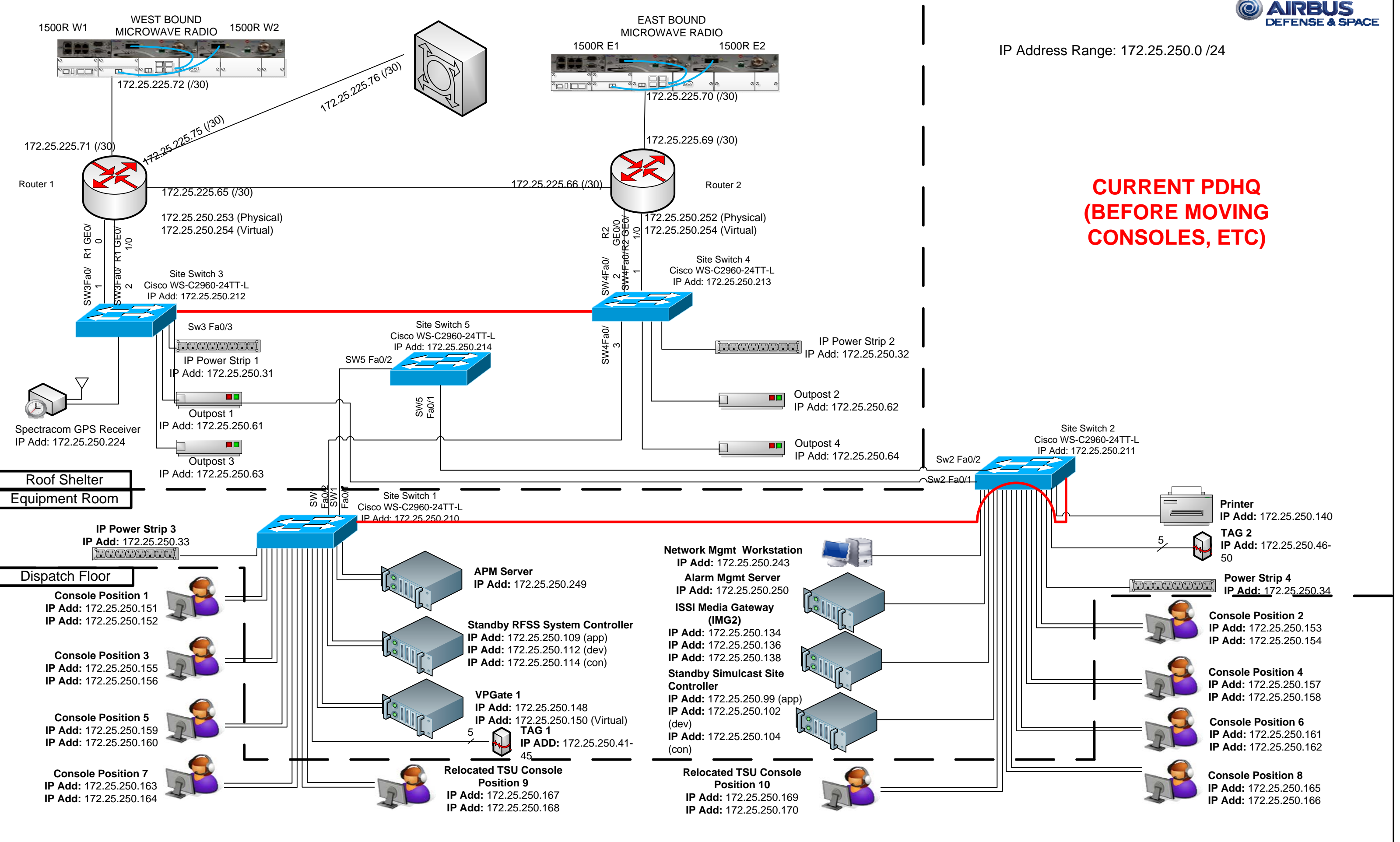
Filename: LFUCG PSOC Project – May 18 2015.vsd

Engineer: Peter Ungar

Page: 1 of 7

IP Address Range: 172.25.250.0 /24

**CURRENT PDHQ
(BEFORE MOVING
CONSOLES, ETC)**



**Roof Shelter
Equipment Room**

Dispatch Floor

- Console Position 1**
IP Add: 172.25.250.151
IP Add: 172.25.250.152
- Console Position 3**
IP Add: 172.25.250.155
IP Add: 172.25.250.156
- Console Position 5**
IP Add: 172.25.250.159
IP Add: 172.25.250.160
- Console Position 7**
IP Add: 172.25.250.163
IP Add: 172.25.250.164

- APM Server**
IP Add: 172.25.250.249
- Standby RFSS System Controller**
IP Add: 172.25.250.109 (app)
IP Add: 172.25.250.112 (dev)
IP Add: 172.25.250.114 (con)
- VPGate 1**
IP Add: 172.25.250.148
IP Add: 172.25.250.150 (Virtual)
- Relocated TSU Console Position 9**
IP Add: 172.25.250.167
IP Add: 172.25.250.168

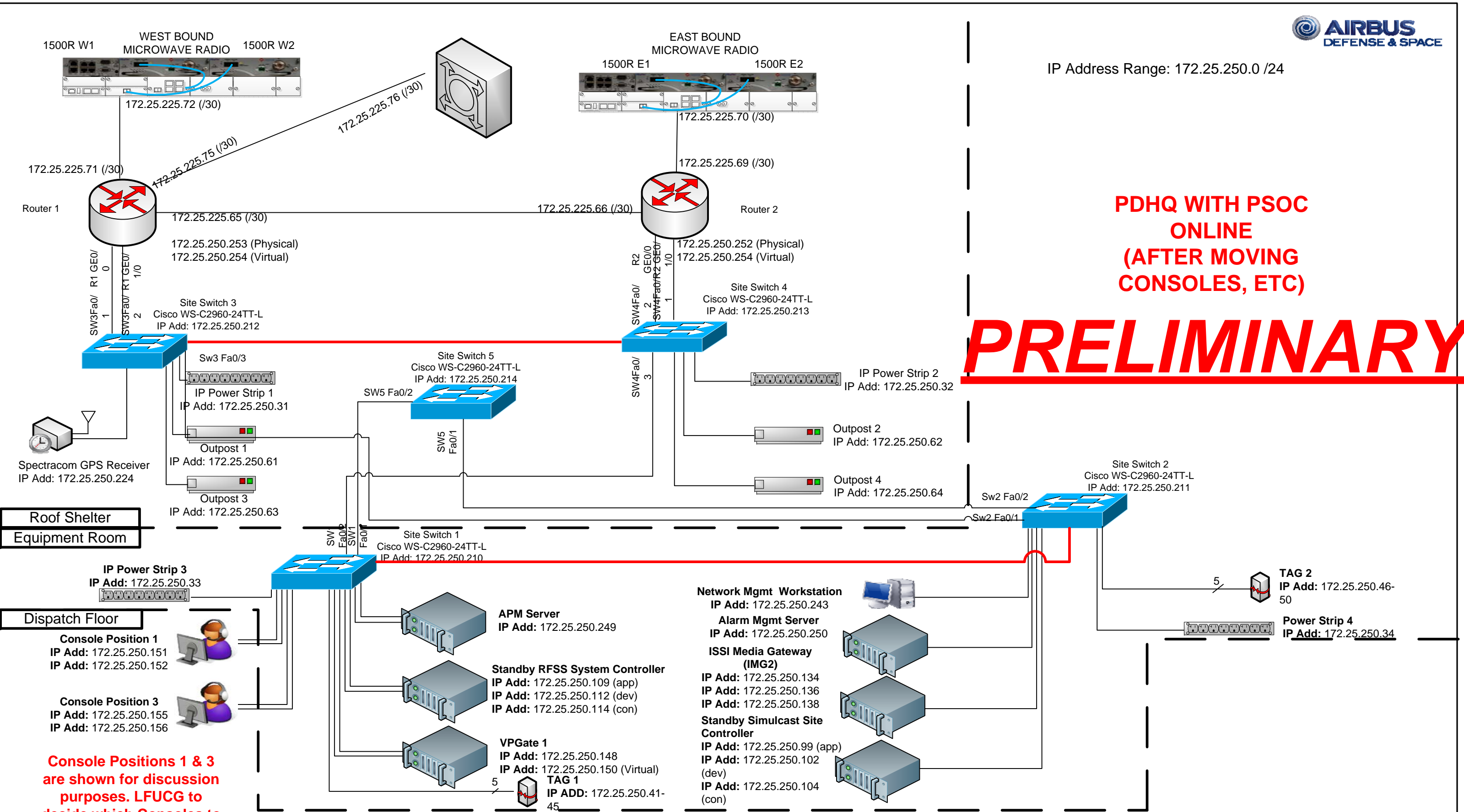
- Network Mgmt Workstation**
IP Add: 172.25.250.243
- Alarm Mgmt Server**
IP Add: 172.25.250.250
- ISSI Media Gateway (IMG2)**
IP Add: 172.25.250.134
IP Add: 172.25.250.136
IP Add: 172.25.250.138
- Standby Simulcast Site Controller**
IP Add: 172.25.250.99 (app)
IP Add: 172.25.250.102 (dev)
IP Add: 172.25.250.104 (con)
- Relocated TSU Console Position 10**
IP Add: 172.25.250.169
IP Add: 172.25.250.170

- Printer**
IP Add: 172.25.250.140
- TAG 2**
IP Add: 172.25.250.46-50
- Power Strip 4**
IP Add: 172.25.250.34
- Console Position 2**
IP Add: 172.25.250.153
IP Add: 172.25.250.154
- Console Position 4**
IP Add: 172.25.250.157
IP Add: 172.25.250.158
- Console Position 6**
IP Add: 172.25.250.161
IP Add: 172.25.250.162
- Console Position 8**
IP Add: 172.25.250.165
IP Add: 172.25.250.166

IP Address Range: 172.25.250.0 /24

**PDHQ WITH PSOC
ONLINE
(AFTER MOVING
CONSOLES, ETC)**

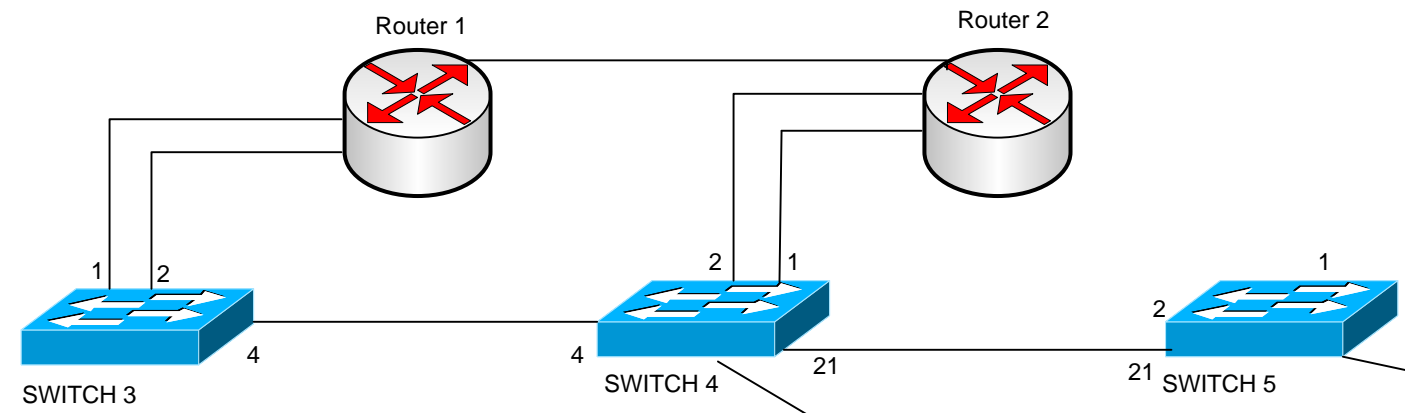
PRELIMINARY



**Console Positions 1 & 3
are shown for discussion
purposes. LFUCG to
decide which Consoles to
leave in place at PDHQ**

**Eight (8) Consoles to be relocated from
LFUCG PD HQ to the LFUCG PSOC**

May 18 2015



Equipment Room immediately adjacent to the LFUCG PD Communications Center

CURRENT PDHQ CONSOLES

LFUCG PD Communications Center

VPGate 1
IP Add: 172.25.250.148
IP Add: 172.25.250.150 (Virtual)

VPGate 2
IP Add: 172.25.250.149
IP Add: 172.25.250.150 (Virtual)

“ODD” Consoles are connected to PDHQ Switch 4

Console Position 1
IP Add: 172.25.250.151
IP Add: 172.25.250.152

Console Position 3
IP Add: 172.25.250.155
IP Add: 172.25.250.156

Console Position 5
IP Add: 172.25.250.159
IP Add: 172.25.250.160

Console Position 7
IP Add: 172.25.250.163
IP Add: 172.25.250.164

Relocated TSU Console Position 9
IP Add: 172.25.250.167
IP Add: 172.25.250.168

Console Position 2
IP Add: 172.25.250.153
IP Add: 172.25.250.154

Console Position 4
IP Add: 172.25.250.157
IP Add: 172.25.250.158

Console Position 6
IP Add: 172.25.250.161
IP Add: 172.25.250.162

“EVEN” Consoles are connected to PDHQ Switch 5

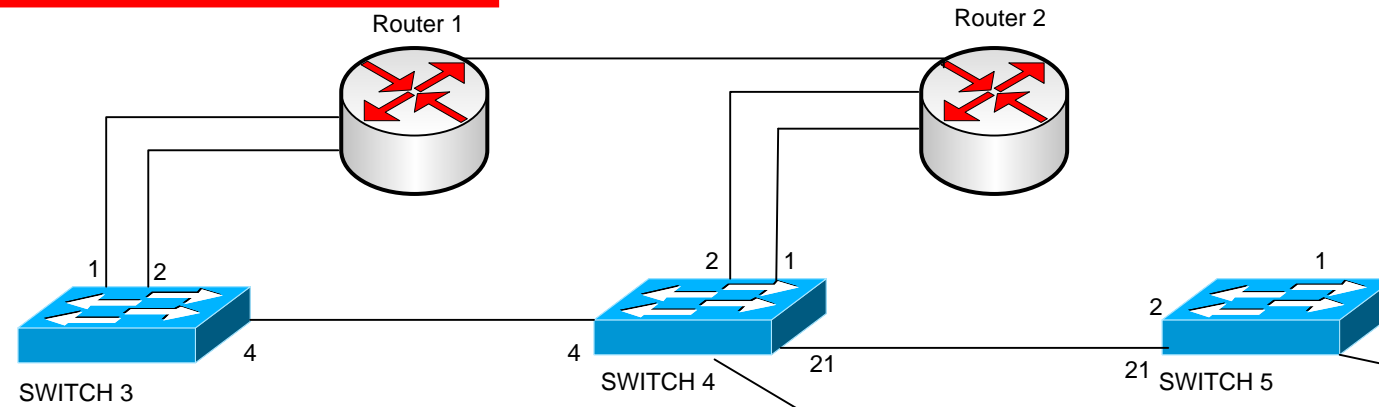
Console Position 8
IP Add: 172.25.250.165
IP Add: 172.25.250.166

Relocated TSU Console Position 10
IP Add: 172.25.250.169
IP Add: 172.25.250.170

Eight (8) Consoles to be relocated from LFUCG PD HQ to the LFUCG PSOC

PRELIMINARY

IP Address Range: 172.25.250.0 /24



Equipment Room immediately adjacent to the LFUCG PD Backup Communications Center

PDHQ WITH PSOC ONLINE (AFTER MOVING CONSOLES, ETC)

LFUCG PD **BACKUP** Communications Center (After the New PSOC is on-line)

VPGate 1
IP Add: 172.25.250.148
IP Add: 172.25.250.150 (Virtual)

VPGate 2
IP Add: 172.25.250.149
IP Add: 172.25.250.150 (Virtual)

Console Position ODD
IP Add: 172.25.250.151
IP Add: 172.25.250.152



Console Positions 1 & 3 are shown for discussion purposes. LFUCG to decide which Consoles to leave in place at PDHQ

“ODD” Consoles are connected to PDHQ Switch 4

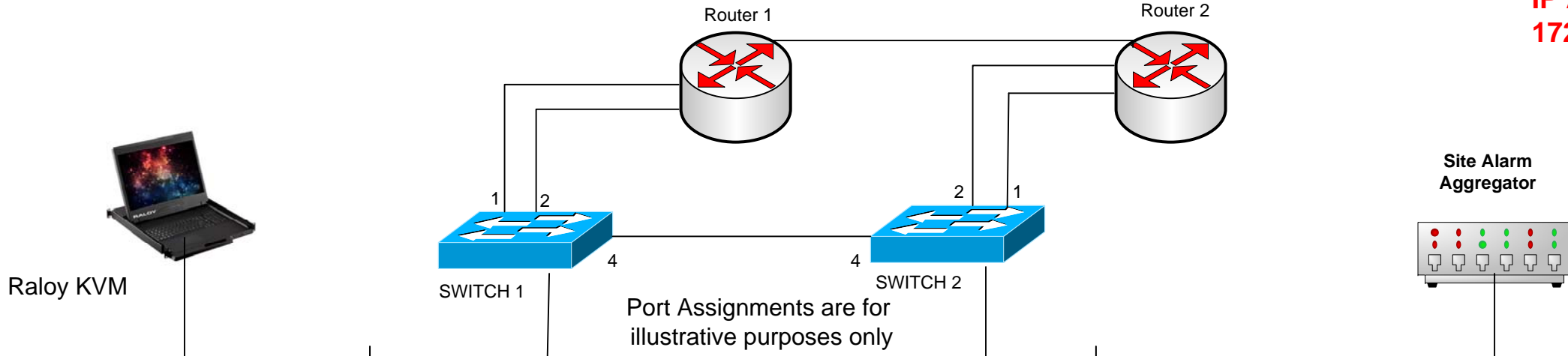


Console Position EVEN
IP Add: 172.25.250.153
IP Add: 172.25.250.154

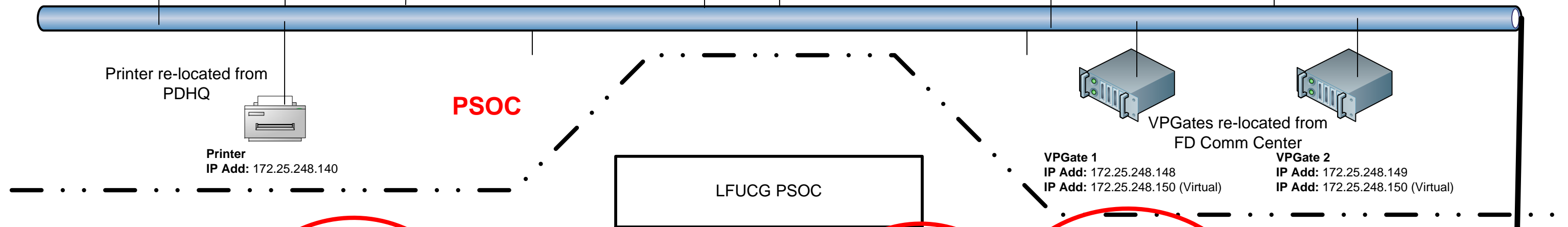
“EVEN” Consoles are connected to PDHQ Switch 5



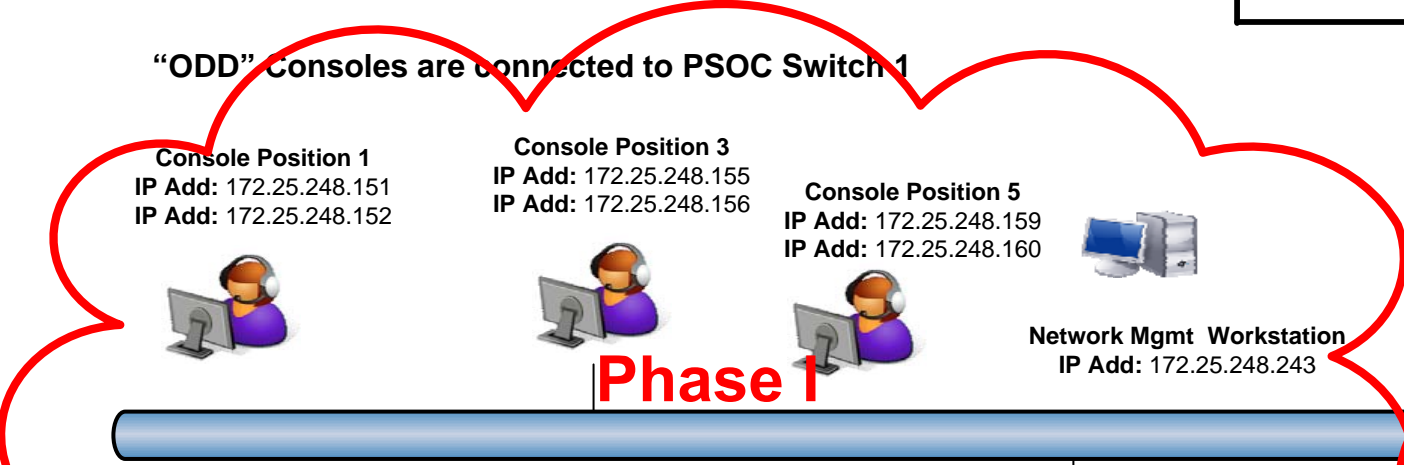
**ASSIGNING LFUCG PSOC
IP Address Range:
172.25.248.0 /24**



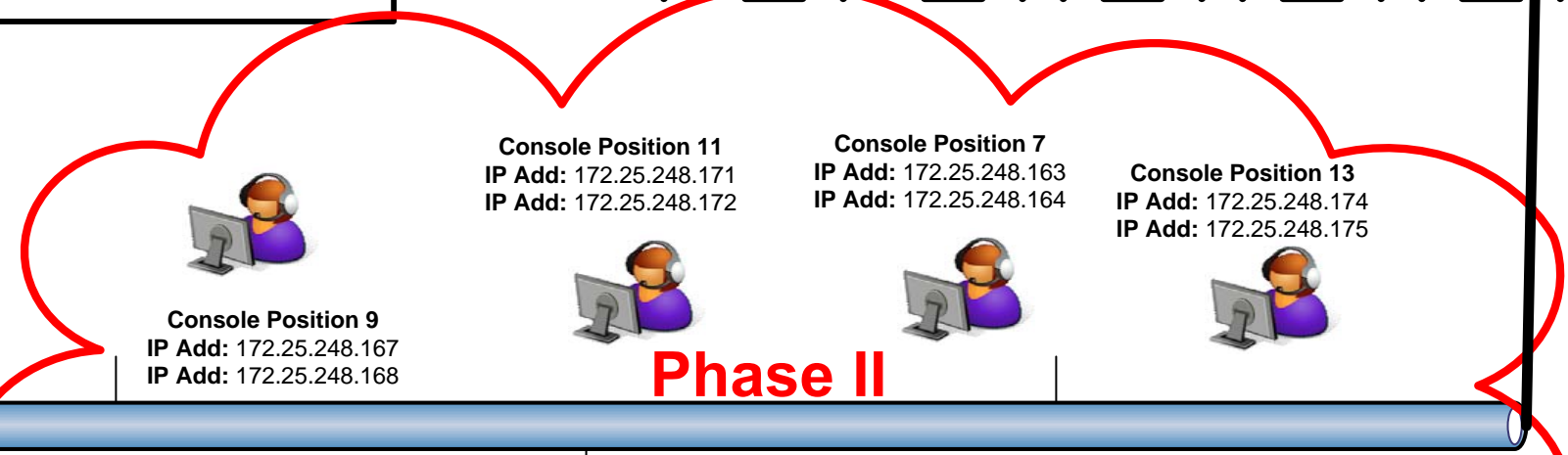
PRELIMINARY



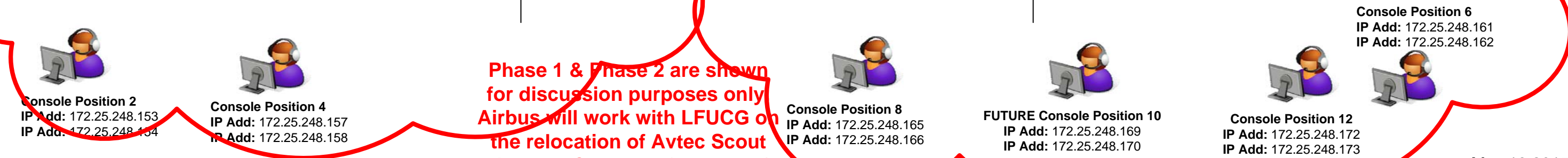
“ODD” Consoles are connected to PSOC Switch 1



Phase I



Phase II

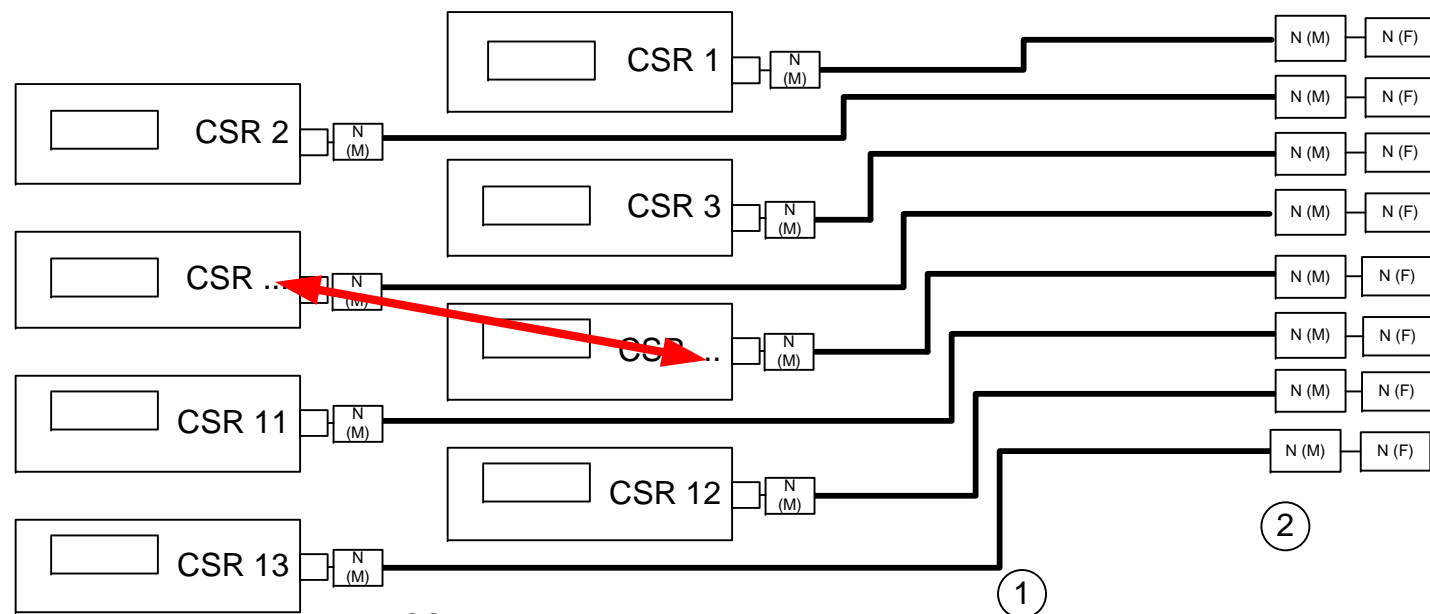


“EVEN” Consoles are connected to PSOC Switch 2

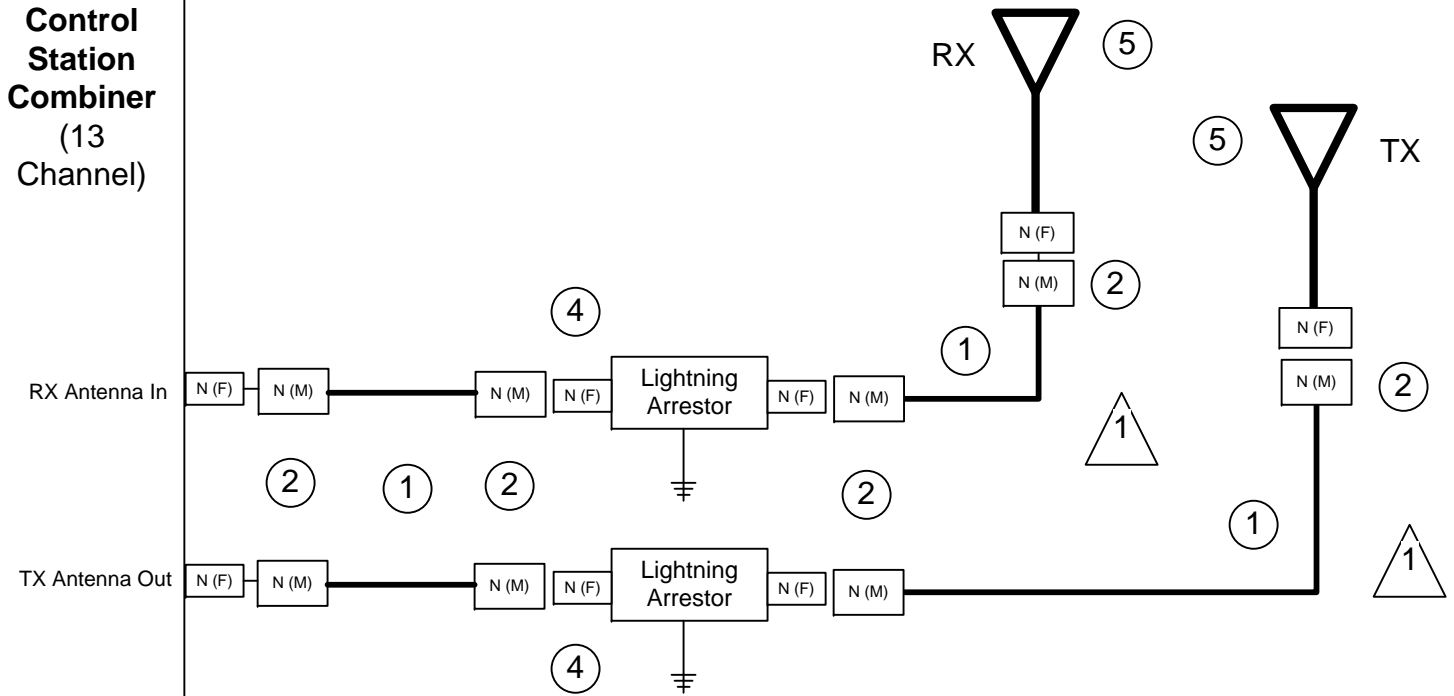
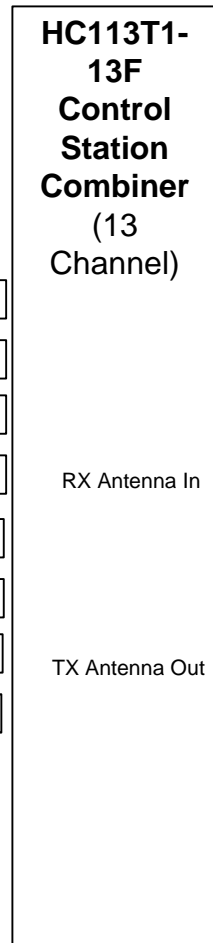
**Phase 1 & Phase 2 are shown for discussion purposes only
Airbus will work with LFUCG on the relocation of Avtec Scout Dispatch Consoles from PDHQ & FD Communications Center**

May 18 2015

Twelve (12) CSR's in a Remote Control Head Configuration to be deployed at the PSOC



② CSR's are to be Tait TM9435 in a Remote Control Head Configuration



- ① Andrew Corp Model # FSJ4-50B 1/2" Superflex Cable (est 100-feet)
- ② Andrew Corp Model # F4PNMV2-HC N-Male Connector for Cable Type 1/2" Superflex (Qty = 32)
- ③ 1/2" Ground Strap (Qty = 6)
- ④ Lightning Surge Protection PolyPhaser DGXH+24DFDF-A (Qty = 2)
- ⑤ SC433-HF1SNF Collinear Omni-directional, 2.5 dBd gain antenna (Qty = 2)
- △ 1 Feedline Grounding Kits shall be installed at the antenna, before the cable enters the building, and mid cable run

PRELIMINARY

**PSOC CONTROL
STATION COMBINING**



Lexington-Fayette Urban County Government

PSOC Consolidation & BGA Upgrade Options

Exhibit 5 - Pricing

March 20, 2015

LFUCG Cost Proposal - V1.0 NA423

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Pricing Summary	
Airbus DS Communications Expansion COST	
TOTAL Option 1 - Console Relocation	\$139,751
TOTAL Option 2 - PSOC Microwave and Construction	\$790,229
TOTAL Option 3 - PSOC P25 expansion	\$653,680
Logging Recorder License	\$33,040
Partnership Discount	(\$83,040)
Total Cost	\$1,533,660

Isolation Transformer Option for PSOC	\$8,423
Used Shelter Option Savings (based on availability)	(\$25,000)
Years 2-8 (2017-2023) - Mandatory Limited Maintenance (per year) for LFUCG expansion only	\$18,150
Years 2-8 (2017-2023) - Optional Extended Maintenance (per year) for LFUCG expansion only	\$27,150

Payment Terms

Airbus DS Communications shall invoice LFUCG and BGA for their portions of the System Price upon occurrence of the following milestones:

Notice to Proceed	10%
Final Design Approved	30%
Sites Ready for Installation	20%
Site Installation Complete	20%
Coverage Acceptance	10%
Final Acceptance	10%

Upon completion of each milestone in accordance with the Project Schedule, payment shall be made within thirty (30) days after LFUCG's and BGA's receipt of a corresponding invoice. Payments are due no later than the date indicated in the Project Schedule

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PSOC Console Relocation		<i>Subsystem Name: Dispatch Consoles</i>				
		<i>Site Name: Cisco Rd. (PSOC)</i>				
Part Number	Description	Qty	List Price	Discount	Discounted Unit Cost	Discounted Extended Cost
Dispatch LAN, WAN Equipment - Partially Included with Option 3						
Cisco C2911/K9 Router	cisco 2911 / K9 router	0	\$2,054	0%	\$2,054	\$0
CON-SNT-2911	Cisco Smartnet NBD 8x5 - 1 Year for 2911 Router	0	\$504	0%	\$504	\$0
L-SL-29-DATA-K9	License for data features for 29xx Router	0	\$543	0%	\$543	\$0
WS-C2960+24TC-S	Switch (24 ports)	2	\$518	0%	\$518	\$1,037
Cisco Smartnet NBD 8x5 for 2960	Cisco SmartNet NBD 8x5 - 1 YEAR for 2960	2	\$49	0%	\$49	\$97
GLC-LH-SM	L95101-0007-01 Cisco Gigabit Ethernet Transceiver Modules	0	\$781	0%	\$781	\$0
Racked RF Control Stations interfaced into						
Tait TM9435	Control Station Radios only - does not include remote console	0	\$2,696	0%	\$2,696	\$0
FSJ4-50B	1/2 inch superflex	1300	\$4	0%	\$4	\$5,131
F4PNMV2-HC	N-Male 1/2" Superflex Cbl	32	\$32	0%	\$32	\$1,010
SG12-12B2U	Grounding Kit for 1/2"	6	\$23	0%	\$23	\$141
HC113T1-13F	P25 Control Station Combiner - 13 inputs	1	\$13,864	0%	\$13,864	\$13,864
DB8926	1 Watt N-type 50 Ohm load	14	\$23	0%	\$23	\$321
IS-B50HN-C2	PolyPhaser lightning arrestor	7	\$82	0%	\$82	\$575
DGXH+24DFDF-A	Lightning Surge Protector	2	\$214	0%	\$214	\$429
SC433-HF1SNF	Collinear Omni-Directional, 2.5 dBd gain antennae	2	\$429	0%	\$429	\$857
Professional Services						
Project Management						\$26,647
Engineering						\$31,445
Staging, Optimization, Programming, Installation						\$58,196
TOTAL Option 1 - Console Relocation						\$139,751

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PSOC Microwave and Construction		<i>Subsystem Name: Microwave Ring, Construction</i>				
		<i>Site Name: Cisco Rd. (PSOC)</i>				
Part Number	Description	Qty	List Price	Discount	Discounted Unit Cost	Discounted Extended Cost
Simulcast Site Shelter Equipment						
Shelter	Supply of prefabricated one-room concrete shelter (12'x20') furnished with all necessary materials including air-conditioning unit.	1	\$118,209	0%	\$118,209	\$118,209
Tower	Supply of 150', 4-leg self-support tower, foundation, tower grounding system, aerial beacons and related services	1	\$152,139	0%	\$152,139	\$152,139
Microwave Equipment						
15R-IDC-ETH-Extend	1500R IDC with Eth WSC Extended	3	\$700	0%	\$700	\$2,100
15R-IDU	1500R IDU chassis	3	\$200	0%	\$200	\$600
CVEM	CeraView Element Manager 2.51	2	\$153	0%	\$153	\$306
15R-155-SM/SC-WXP	1500R IDM 155M SM/SC With XPIC	5	\$2,200	0%	\$2,200	\$11,000
RFU-HP-1R-6L	RFU-HP 6LG 1Rx up to 56M SM/All Indoor	5	\$4,083	0%	\$4,083	\$20,415
OCB-Pole Mount	OCB-Pole Mount	2	\$200	0%	\$200	\$400
OCB-CPLR-6	OCB Coupler 6GHz	2	\$624	0%	\$624	\$1,248
15OCBf-xxxY-ZZ-H	OCB fGHz (1Rx) TX High	2	\$1,247	0%	\$1,247	\$2,495
15OCBf-xxxY-ZZ-L	OCB fGHz (1Rx) TX low	2	\$1,247	0%	\$1,247	\$2,495
15HP-TERM-137	1500HP 50 Ohm Termination,WR137	4	\$106	0%	\$106	\$425
15HP-SHORT-137	15HP Short for WR137	4	\$25	0%	\$25	\$100
DPSA-HP-4-6L-A	ANT,4FT,5.925-6.425GHZ DP,CPR137G,	2	\$2,778	0%	\$2,778	\$5,556
A-4_6-STRT-INBRD-A	Strut for TMW/VL3 4_6ft Antenna - Andrew	2	\$341	0%	\$341	\$682
WAVEGUIDE-6-4FT	FLEX WG 1.2m 6GHz	2	\$300	0%	\$300	\$600
PRT-SM/SC	SM/SC OPTICAL SPLITTER CONN. 1300nm 50/50 1M KIT	4	\$106	0%	\$106	\$424

15P-PROT-CBL	E1/T1/Ethernet protection cable	6	\$8	0%	\$8	\$48
15R-USER-CHAN-SYNC-CBL-2.5M	1500R Sync User Channels open cable 2.5m	4	\$35	0%	\$35	\$140
CBL-GND	GROUND CABLE FOR IDU and ODU	4	\$6	0%	\$6	\$24
PSOC Microwave and Construction		<i>Subsystem Name: Microwave Ring, Construction</i>				
		<i>Site Name: Cisco Rd. (PSOC)</i>				
Part Number	Description	Qty	List Price	Discount	Discounted Unit Cost	Discounted Extended Cost
SI-1039-0	19 inch Seismic Rack	1	\$1,150	0%	\$1,150	\$1,150
217035	19" KIT BATTERY TRAY RACK HEAVY DUTY	1	\$312	0%	\$312	\$312
SI-0864-0	DC POWER SYSTEM,19INCH,1U,2550W	1	\$487	0%	\$487	\$487
SI-0863-0	Power Rectifier 850W Delta	3	\$316	0%	\$316	\$948
SI-0475-0	12V 150AH BATT SET	4	\$516	0%	\$516	\$2,064
MD-53	3ft antenna ice shield	0	\$1,000	0%	\$1,000	\$0
FKCN5551D-T	Supervisory unit Evolution Series. D version. 4xFE Ports. Ethernet Mapper for XPAND and METRO Wayside supported, requires licence	3	\$280	0%	\$280	\$840
FLDY5623A-T	155 Mb/s optical single mode (S-1.1) interface unit	3	\$490	0%	\$490	\$1,470
ABZ6884	IFU Mounting kit	2	\$16	0%	\$16	\$32
UWA6462	IFU/ODU Grounding kit	2	\$48	0%	\$48	\$96
88W5362-PWR10000	Power cable, 10m	2	\$23	0%	\$23	\$46
FWP5705A-T	IFU power supply, used when IFU has no RIU.	3	\$198	0%	\$198	\$594
Ant Pol mount 4-6FT	Ant Pol mount 4-6FT	2	\$760	0%	\$760	\$1,520
08108-01	Seismic anchor kit for rack	1	\$184	0%	\$184	\$184
MISC	Installation Material	4	\$6,200	0%	\$6,200	\$24,800
Tank	Supply of UPS backup 2 hours	1	\$47,250	0%	\$47,250	\$47,250
Professional Services						
Project Management						\$53,204
Engineering						\$25,156
Staging, Optimization, Programming, Installation						\$118,283
Site Development						\$192,388
TOTAL Option 2 - PSOC Microwave and Construction						\$790,229

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Simulcast Subsystem		<i>Subsystem Name: Simulcast Cell</i>				
		<i>Site Name: Cisco Rd. (PSOC)</i>				
Part Number	Description	Qty	List Price	Discount	Discounted Unit Cost	Discounted Extended Cost
Core Licenses						
SC5000i L022	Simulcast Trunking Site Controller Connectivity license / 1 per simulcast sub-site controlled	1	\$15,500	20%	\$12,400	\$12,400
SC5000i L023	Simulcast Trunking Site Controller P25 Ph1 trunking license / 1 per RF Repeater Controlled	9	\$10,300	20%	\$8,240	\$74,160
P25 Infrastructure						
TB55-A1-K4-1D	TB5500i UHF 700/800M 100W AC Advanced Simulcast	9	\$24,579	0%	\$24,579	\$221,211
	Failsoft	9	Included	0%	\$0	\$0
Simulcast Remote Site Antenna System						
SPD-1066Rack	19InchOpenCabinet with top plate - Nut, Bolts and Tie Wraps - Caster kit-4 wheels	3	\$2,613	0%	\$2,613	\$7,839
AP7831	Metered Rack PDU	3	\$493	0%	\$493	\$1,480
DBCNRX-16AC	PDU / 16 CH RX Multicoupler	1	\$4,397	0%	\$4,397	\$4,397
DB8922	50 ohm BNC male termination	1	\$6	0%	\$6	\$6
ATS8TMA30	Tower Top Amplifier (806-824 MHz)	1	\$2,816	0%	\$2,816	\$2,816
LDF7-50A	1 5/8" inch Heliac	600	\$14	0%	\$14	\$8,684
DSCC85-08N	8 Channel Ceramic TX Cavity Combiner 700 MHz and 800 MHz	2	\$11,252	0%	\$11,252	\$22,505
BMR-12-O-B1	Penetrator Omni Antenna, 12.0 dB, 806-869 MHz	2	\$5,074	0%	\$5,074	\$10,147
SMK345-A7	Antenna Side Mount Kit, 7.5' max. from tower, max. 5' tower leg spacing	2	\$2,179	0%	\$2,179	\$4,358
LDF5-50A	7/8 inch Heliac	600	\$5	0%	\$5	\$3,237
IS-B50HN-C2-ME	PolyPhaser Surge Arrestor (N Female/ N Female)700 M to 2.7 GHz	2	\$82	0%	\$82	\$164
WSH-U78	LDF5-50A Hanger Kits	15	\$18	0%	\$18	\$267
SG78-06B2A	LDF5-50A Ground Kits	8	\$24	0%	\$24	\$191
42396A-5	LDF7-50A Hanger Kits	8	\$29	0%	\$29	\$232
CSGL5-15B4T	LDF7-50A Ground Kits	4	\$28	0%	\$28	\$111
L5TNIM-PS	LDF5-50 "N" Male Connector	2	\$31	0%	\$31	\$62

Simulcast Subsystem		<i>Subsystem Name: Simulcast Cell</i>				
		<i>Site Name: Cisco Rd. (PSOC)</i>				
Part Number	Description	Qty	List Price	Discount	Discounted Unit Cost	Discounted Extended Cost
L7PNM-RPC	LDF7-50 "N" Male Connectors	1	\$154	0%	\$154	\$154
FSJ4-50B	1/2" Superflex Cable	40	\$4	0%	\$4	\$158
DB8926	1 Watt N-type 50 Ohm load	11	\$22	0%	\$22	\$246
Simulcast Remote Site Alarm Monitoring Equipment						
SP8-X20	SNMP alarm aggregator	1	\$1,263	0%	\$1,263	\$1,263
DSPM5C-DFE	RF Power monitor	1	\$1,908	0%	\$1,908	\$1,908
Simulcast Remote Site LAN, WAN Equipment						
WS-C2960-24-S	Switch (24 ports)	2	\$518	0%	\$518	\$1,037
CON-SNT-296024S	Cisco SmartNet NBD 8x5 - 1 YEAR for 2960	2	\$49	0%	\$49	\$97
CISCO2911/K9	Router (2911)	2	\$2,054	0%	\$2,054	\$4,108
CON-SNT-2911	Cisco SmartNet NBD 8x5 - 1 YEAR for 2911	2	\$504	0%	\$504	\$1,008
GLC-LH-SM	L95101-0007-01 Cisco Gigabit Ethernet Transceiver Modules	2	\$842	0%	\$842	\$1,683.08
1200-213, 1C, 18, 00, 00, 00, 00	SecureSync (AC/DC (24 or 48VDC), OCXO, GPS, 10MHz, 1PPS output	1	\$7,708	0%	\$7,708	\$7,708
HR8540A	Spectracom 8225 GPS antenna	1	\$274	0%	\$274	\$274
Professional Services						
Project Management						\$73,294
Engineering						\$65,445
Staging, Optimization, Programming, Installation						\$121,032
TOTAL Option 3 - PSOC P25 expansion						\$653,680

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Logging Recorder Licenses		<i>Subsystem Name: N/A</i>				
		<i>Site Name: N/A</i>				
Part Number	Description	Qty	List Price	Discount	Discounted Unit Cost	Discounted Extended Cost
Core Licenses						
UC5000i L021	P25 CSSI : digital recorder interface license / 1 per line (voice path)	11	\$2,600	30%	\$1,820	\$20,020
UC5000i L020	P25 CSSI : IP console interface license / 1 per CSSI interface	2	\$9,300	30%	\$6,510	\$13,020
TOTAL Logging Recorder Licenses						\$33,040

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
21' LRE with 7'-6" lightning rod (arm=11.5')	150	6' Bogner Mount Standard Duty	140
Beacon	150	BMR12	140
Beacon	150	BMR12 (20% additional loading)	140
BMR12	150	6' Bogner Mount Standard Duty (20% additional loading)	140
6' Bogner Mount Standard Duty	150	BMR12 (20% additional loading)	140
TMA (12"x12"x8")	150	6' Bogner Mount Standard Duty (20% additional loading)	140
BMR12 (20% additional loading)	150	PAR6-59 w/o Radome	130
6' Bogner Mount Standard Duty (20% additional loading)	150	PAR6-59 w/o Radome	130
TMA (12"x12"x8") (20% additional loading)	150	PAR6-59 w/o Radome (20% additional loading)	130
6' Bogner Mount Standard Duty	140	PAR6-59 w/o Radome (20% additional loading)	130
BMR12	140		

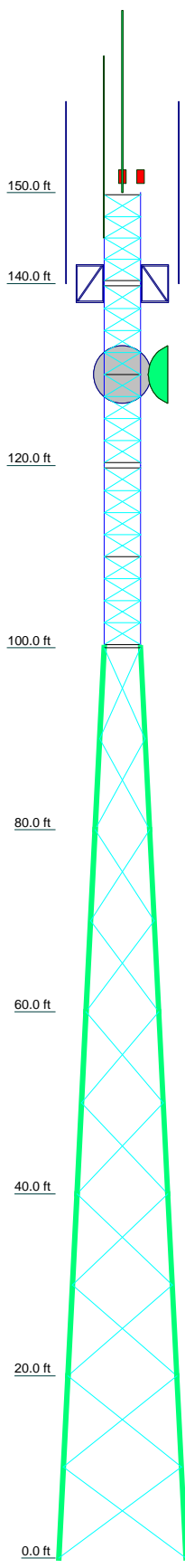
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-58	58 ksi	75 ksi	A36	36 ksi	58 ksi
A572-50	50 ksi	65 ksi			

TOWER DESIGN NOTES

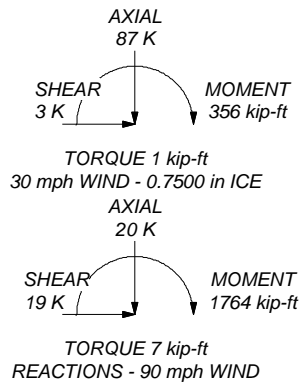
1. Tower is located in Fayette County, Kentucky.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 90 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 30 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class III.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 88.7%

Section	T1	T2	T3	T4	T5	T6	T7	T8
Legs	SR 1 1/4	SR 1 1/2	SR 2					
Leg Grade				A572-58				
Diagonals		SR 3/4			L2 1/2x2 1/2x3/16			
Diagonal Grade		A572-50			A36			
Top Girts		SR 7/8		L3x3x3/16				
Mid Girts	N.A.				N.A.			
Bottom Girts		SR 7/8			N.A.			
Horizontals		SR 3/4			N.A.			
Face Width (ft)	4			6	8	10	12	14
# Panels @ (ft)	4 @ 2.35417				10 @ 10			
Weight (K)	0.4	0.8	1.1	1.9	2.0	2.0	2.1	12.3



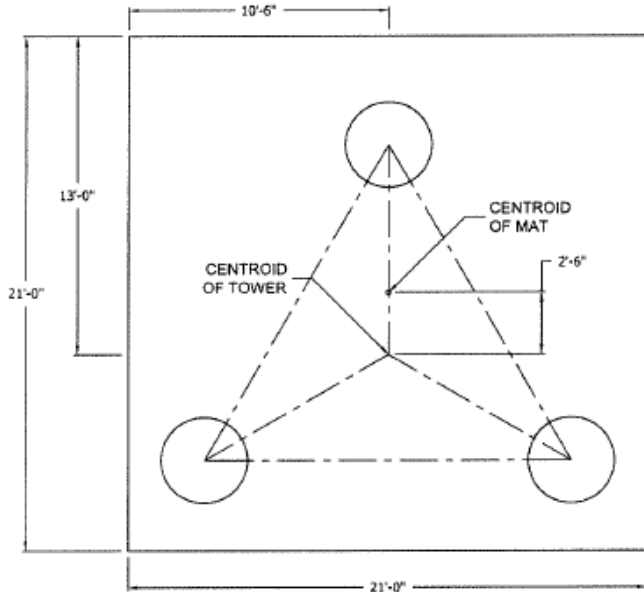
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
 DOWN: 151 K
 UPLIFT: -137 K
 SHEAR: 14 K

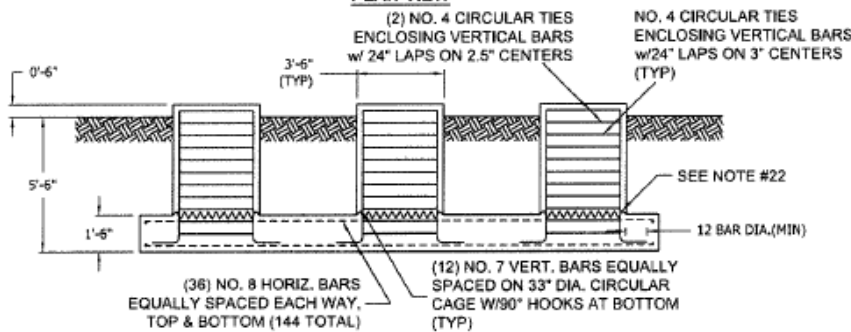


valmont STRUCTURES 1545 Pidco Drive
 Plymouth, IN 46563
 Valmont Structures, Inc. - Specialty Structures Group Phone: (574) 936-4221
 FAX: (574) -936-6458

Job: **Quotation 295734-01**
 Project: **U-14 x 150' - Fayette County, KY**
 Client: Tower Systems, Inc. Drawn by: CRF1 App'd:
 Code: TIA-222-G Date: 06/17/15 Scale: NTS
 Path: Dwg No. E-1



PLAN VIEW



ELEVATION VIEW

CONCRETE VOLUME (cu.yds)

	ROUND SQUARE	
PIER	4.8	6.1
PAD	24.5	24.5
TOTAL	29.3	30.6

FACTORED REACTIONS

Maximum O.T.M =	2,260.79 FT-K
Total Tower Wt =	19.16 KIPS
Total Shear =	24.64 KIPS
Max. Shear/Leg =	15.15 KIPS
Max. Ten./Leg =	153.31 KIPS
Max. Comp./Leg =	183.68 KIPS

GENERAL NOTES

- FOUNDATION DESIGN HAS BEEN DEVELOPED IN ACCORDANCE WITH GENERALLY ACCEPTED PROFESSIONAL ENGINEERING PRINCIPLES AND PRACTICES WITHIN THE LIMITS OF THE SUBSURFACE DATA PROVIDED. FOUNDATION DESIGN MODIFICATIONS MAY BE REQUIRED IN THE EVENT THE FOLLOWING DESIGN PARAMETERS ARE NOT APPLICABLE FOR THE SUBSURFACE CONDITIONS ENCOUNTERED.
 - ULTIMATE SOIL BEARING PRESSURE AT 5.5 FT DEPTH = 4,000 PSF.
 - GROUND WATER TABLE IS AT OR BELOW FOUNDATION DEPTH.
 - MAXIMUM FROST PENETRATION DEPTH LESS THAN FOUNDATION DEPTH.
- WORK SHALL BE IN ACCORDANCE WITH LOCAL CODES, SAFETY REGULATIONS AND UNLESS OTHERWISE NOTED, THE LATEST REVISION OF ACI 318, "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", PROCEDURES FOR THE PROTECTION OF EXCAVATIONS, EXISTING CONSTRUCTION AND UTILITIES SHALL BE ESTABLISHED PRIOR TO FOUNDATION INSTALLATION.
- CONCRETE MATERIALS SHALL CONFORM TO THE APPROPRIATE STATE REQUIREMENTS FOR EXPOSED STRUCTURAL CONCRETE.
- PROPORTIONS OF CONCRETE MATERIALS SHALL BE SUITABLE FOR THE INSTALLATION METHOD UTILIZED AND SHALL RESULT IN DURABLE CONCRETE FOR RESISTANCE TO LOCAL ANTICIPATED AGGRESSIVE ACTIONS. THE DURABILITY REQUIREMENTS OF ACI 318 CHAPTER 4 SHALL BE SATISFIED BASED ON THE CONDITIONS EXPECTED AT THE SITE. AS A MINIMUM, CONCRETE SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 4,500 PSI IN 28 DAYS.
- MAXIMUM SIZE OF AGGREGATE SHALL NOT EXCEED SIZE SUITABLE FOR INSTALLATION METHOD UTILIZED OR 1/3 CLEAR DISTANCE BEHIND OR BETWEEN REINFORCING. MAXIMUM SIZE MAY BE INCREASED TO 2/3 CLEAR DISTANCE PROVIDED WORKABILITY AND METHODS OF CONSOLIDATION SUCH AS VIBRATING WILL PREVENT HONEYCOMBS OR VOIDS.
- REINFORCEMENT SHALL BE DEFORMED AND CONFORM TO THE REQUIREMENTS OF ASTM A615 GRADE 60 UNLESS OTHERWISE NOTED. SPLICES IN REINFORCEMENT SHALL NOT BE ALLOWED UNLESS OTHERWISE INDICATED.
- WELDING IS PROHIBITED ON REINFORCING STEEL AND EMBEDMENTS.
- MINIMUM CONCRETE COVER FOR REINFORCEMENT SHALL BE 3 INCHES (76 MM) UNLESS OTHERWISE NOTED. APPROVED SPACERS SHALL BE USED TO INSURE A 3 INCH (76 MM) MINIMUM COVER ON REINFORCEMENT.
- CONCRETE COVER FROM TOP OF FOUNDATION TO ENDS OF VERTICAL REINFORCEMENT SHALL NOT EXCEED 3 INCHES (76MM) NOR BE LESS THAN 2 INCHES (51MM).
- FOUNDATION DESIGN ASSUMES STRUCTURAL BACKFILL TO BE COMPACTED IN 8 INCH (200 MM) MAXIMUM LAYERS TO 95% OF MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT IN ACCORDANCE WITH ASTM D698. ADDITIONALLY, STRUCTURAL BACKFILL MUST HAVE A MINIMUM COMPACTED UNIT WEIGHT OF 100 POUNDS PER CUBIC FOOT (16 KN/M3).
- FOUNDATION DESIGN HAS BEEN BASED ON GEOTECHNICAL REPORT NO. **LFUGG PSOC AIRBUS COMMUNICATIONS TOWER DATED 6/5/2015 BY L.E. GREGG ASSOCIATES.**
- FOUNDATION DEPTH INDICATED IS BASED ON THE GRADE LINE DESCRIBED IN THE REFERENCED GEOTECHNICAL REPORT. FOUNDATION MODIFICATION MAY BE REQUIRED IN THE EVENT CUT OR FILL OPERATIONS HAVE TAKEN PLACE SUBSEQUENT TO THE GEOTECHNICAL INVESTIGATION.
- FOUNDATION DESIGN ASSUMES LEVEL GRADE AT STRUCTURE SITE.
- FOUNDATION DESIGN ASSUMES THE RECOMMENDATIONS IN THE REFERENCED GEOTECHNICAL REPORT CONCERNING VERIFICATION OF SUBSURFACE CONDITIONS ARE IMPLEMENTED PRIOR TO PLACEMENT OF CONCRETE.
- FOUNDATION INSTALLATION SHALL BE SUPERVISED BY PERSONNEL KNOWLEDGEABLE AND EXPERIENCED WITH THE PROPOSED FOUNDATION TYPE. CONSTRUCTION SHALL BE IN ACCORDANCE WITH GENERALLY ACCEPTED INSTALLATION PRACTICES.
- FOUNDATION DESIGN ASSUMES INSTALLATION PROCEDURES WILL INCORPORATE THE PROCEDURES RECOMMENDED IN THE REFERENCED GEOTECHNICAL REPORT.
- FOUNDATION DESIGN ASSUMES FIELD INSPECTIONS WILL BE PERFORMED TO VERIFY THAT CONSTRUCTION MATERIALS, INSTALLATION METHODS AND ASSUMED DESIGN PARAMETERS ARE ACCEPTABLE BASED ON CONDITIONS EXISTING AT THE SITE.
- FOR FOUNDATION AND ANCHOR TOLERANCES SEE ANCHOR BOLT LAYOUT DRAWING.
- LOOSE MATERIAL SHALL BE REMOVED FROM BOTTOM OF EXCAVATION PRIOR TO CONCRETE PLACEMENT. SIDES OF EXCAVATION SHALL BE ROUGH AND FREE OF LOOSE CUTTINGS.
- CONCRETE SHALL BE PLACED IN A MANNER THAT WILL PREVENT SEGREGATION OF CONCRETE MATERIALS, INFILTRATION OF WATER OR SOIL AND OTHER OCCURRENCES WHICH MAY DECREASE THE STRENGTH OR DURABILITY OF THE FOUNDATION.
- CONCRETE PREFERABLY SHALL BE PLACED AGAINST UNDISTURBED SOIL. WHEN FORMS ARE NECESSARY, THEY SHALL BE REMOVED PRIOR TO PLACING STRUCTURAL BACKFILL.
- CONSTRUCTION JOINTS, IF REQUIRED AT THE BASE OF THE PIERS, MUST BE INTENTIONALLY ROUGHENED TO A FULL AMPLITUDE OF 1/4 INCH (6 MM). FOUNDATION DESIGN ASSUMES NO OTHER CONSTRUCTION JOINTS.
- TOP OF FOUNDATION OUTSIDE LIMITS OF ANCHOR BOLTS SHALL BE SLOPED TO DRAIN WITH A FLOATED FINISH. AREA INSIDE LIMITS OF ANCHOR BOLTS SHALL BE LEVEL WITH A SCRATCHED FINISH.
- EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 3/4" X 3/4" (19MM X 19MM) MINIMUM.

NOTE: SEE STRUCTURE ASSEMBLY DRAWING FOR FOUNDATION LAYOUT AND ANCHORAGE EMBEDMENT DRAWING NUMBER.

LFUCG Cost Proposal - V1.0 NA423

AIRBUS DS Communications

home of VESTA®

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Pricing Summary	
Airbus DS Communications Expansion COST	
TOTAL Option 1 - Console Relocation	\$139,751
TOTAL Option 2 - PSOC Microwave and Construction	\$790,229
TOTAL Option 3 - PSOC P25 expansion	\$653,680
Logging Recorder License	\$33,040
Partnership Discount	(\$83,040)
Total Cost	\$1,533,660

Isolation Transformer Option for PSOC	\$8,423
Used Shelter Option Savings (based on availability)	(\$25,000)
Years 2-8 (2017-2023) - Mandatory Limited Maintenance (per year) for LFUCG expansion only	\$18,150
Years 2-8 (2017-2023) - Optional Extended Maintenance (per year) for LFUCG expansion only	\$27,150

Payment Terms

Airbus DS Communications shall invoice LFUCG and BGA for their portions of the System Price upon occurrence of the following milestones:

Notice to Proceed	10%
Final Design Approved	30%
Sites Ready for Installation	20%
Site Installation Complete	20%
Coverage Acceptance	10%
Final Acceptance	10%

Upon completion of each milestone in accordance with the Project Schedule, payment shall be made within thirty (30) days after LFUCG's and BGA's receipt of a corresponding invoice. Payments are due no later than the date indicated in the Project Schedule



Lexington-Fayette Urban County Government

PSOC Consolidation & BGA Upgrade Options

Answers to Clarification Questions

April 17, 2015

1. Our consultant has installed towers in regional counties in the past year. To better understand the pricing for the tower and how it compares to recent purchases, what equipment and services has Airbus bundled in the price of the tower?

The pricing sheets have been updated to include the description and pricing of the tower. The services and materials included with the tower are the following – tower materials (4-leg SST, and aerial beacons), foundation (assuming normal soil), tower grounding system and related services. Additionally, the attached specification sheets provide more details about the components of the tower.

2. Shelter Specifications

- a. The bid specifications indicate on p. 5 that the shelter will be one room (12x20), but the pricing indicates that the shelter will be two rooms. Please price a one room shelter and advise the cost difference. Advise if the Specify if the shelter has dual HVAC.

The line item within the pricing table was incorrectly labelled as a two-room shelter. Please see the updated pricing table with the correct label. The air-conditioning unit supplied is dual HVAC and it includes a lead/lag controller.

- b. Generator (Tab 1, p. 12) – the PSOC generator will be used for the tower site. Has this been considered in the pricing? Does the pricing consider delivery of generator power to the shelter?

The document assumes that the generator at the PSOC will be provided by LFUCG. However, the electrical work to bring the new feed from the designated facility electrical panel to the shelter is included in the quoted price.

- c. The pricing only includes one rack in the shelter. Is it understood that if additional racks are required that Airbus will supply them?

Correct – racks have been included with the appropriate options for microwave and RF. Airbus anticipates that according to the selected options (1-3) we will be providing 4-6 racks.

3. Environmental Systems (Tab 1, p. 12): LFUCG to provide HVAC. Clarify what is this referring to?

As specified in the pricing sheets, the HVAC units for the shelter at PSOC are provided by Airbus. For equipment in the telecommunications room where the control station radios, dispatch consoles, and other associated equipment will be installed, the supply of the temperature control is the responsibility of LFUCG.

4. Tower

- a. The proposal does not include a line item price for a tower under Option 2. Please clarify.

The pricing sheets have been updated to include the description and pricing of the tower. We apologize for the omission.

- b. The LFUCG may consider hanging additional antenna from the tower in the future (i.e. LFUCG antenna or lease to outside entity). There are no plans to do so at present. However, the LFUCG would like information on the tower's rating.

The attached specification sheets for the tower are based on mounting all of the antennas at the top of the tower, which is the worst-case scenario for the proposed solution. The final additional capacity available for the tower will be determined at the time the design is finalized. As shown in the specification sheets the most conservative case includes additional capacity available on the tower.

- c. What is the wind rating for the tower?

The proposed tower is designed for a 90 mph basic wind in accordance with TIA-222-G.

5. Please provide the specifications and materials for the tower supplied with the proposal.

The proposed tower details and foundation specifications are included in the attached specification sheets. The included CAISSON foundation spec sheets assume normal soil conditions.

6. If the LFUCG decides to bid the tower out separately, how does this impact price and expectations for LFUCG?

The pricing associated with the tower (including services and foundation) has been separated on the pricing sheets to allow LFUCG to remove the tower.

7. CSR's – the LFUCG will obtain Tait CSR's for this project, please advise the credit for the pricing and any expectations/configuration for the CSR components that need to be present upon arrival.

The pricing table has been updated to reflect the removal of the Tait CSRs in option 1. Airbus DS Communications engineering will provide the physical configuration and options requirements for the CSRs. It is our assumption that the CSRs will be delivered to Airbus DS Communications staging facility in Richardson, TX in time for staging so they can be wired and mounted during staging. Finally, LFUCG will be responsible for the programming of the code-plugin.

8. Has Airbus examined the site angle from the microwave antenna mounted at Park Plaza aimed towards the PSOC to ensure there is a clear path? Will it be necessary to stabilize both poles? If so, what is required for stabilization? Note: LFUCG has existing air rights to the roof. However, LFUCG has to approach Park Plaza for permission to add an additional support pole and bracing and the property owner will ask for specifics on any additions on their roof. Details are needed to complete this step.

A preliminary path survey was performed on the link from Cisco Road (PSOC) to Park Plaza (PDHQ). An analysis was also performed using the clutter from Pathloss 5.0 and Google Earth Pro. The downtilt of the antenna pointing towards PSOC is 0.91 degrees.

We have identified an obstruction on the roof, which will require the relocation of the current microwave antenna that will be utilized for the new PSOC. On final coordination with LFUCG and Park Plaza on a suitable mounting location to clear the roof-top obstruction, final determinations will be made in regards to both the new and existing locations and any reinforcement that may be required.

9. The timeline includes two months for planning and design. Does the exercise we are going through presently constitute planning and design or will that phase still need to occur?

The proposed project still needs to have a planning and design phase. However, Airbus DS Communications will work with the County to compress both this phase of the project as well as subsequent phases to be ready for an April 2016 migration to the new PSOC.

10. Regulatory filing (Tab 1, p. 12) – clarify the support that is provided for the necessary filings? Clarify the typical time necessary to complete these filings.

Airbus DS Communications will provide the necessary information to fill out the required forms to be submitted for regulatory filings. LFUCG will file the forms, which have a typical time of 90-120 days (may take longer depending on the regulatory agency's backlog).

11. Structural Analysis (Tab 1, p 12) – please clarify the need for a structural analysis at WLEX if no additional antenna is installed at this site and the direction of the existing antenna the only change at this tower? BGA is not installing a dish in the coming year. Is this now a moot point?

As part of Option 2, Airbus DS Communications has accounted for a structural analysis at WLEX due to the potential that the mount may be required to be moved to a new face on the tower, which in most cases necessitates a new structural analysis.

12. If a tile fails DAQ, the LFUCG would like to have adjacent tiles tested. Agreed? (See coverage testing, Tab 3, p. 15)

Per the CATP provided for this proposal, Airbus DS Communications has included in the scope the DAQ testing only for tiles that fail the drive test. LFUCG may test the adjacent tiles at their discretion, and the results of that test will be for information only.

13. Coverage testing – would Airbus compare the new drive test to the previous drive test and provide a report on the differences.

Correct – Airbus DS Communications will compare the new drive test to the previous test and provide a report on the differences.

14. Is Airbus conducting a drive test of Fayette County to determine if TDI is an issue?

Correct - Airbus DS Communications will perform a drive test to determine that the signal strength and performance is equivalent to the prediction.

15. The Blue Grass Airport has indicated that they do not intend to pursue the options in the proposal that pertain to their operations. Please acknowledge what, if any, impact this decision has on pricing, time-line, etc.

The pricing for Options 1-3 for LFUCG has been updated to reflect the changes. If BGA decides at a later date to pursue Options 4-5, the prices for these options are subject to change due to a required re-mobilization of the teams that could achieve synergies if all five options are purchased at the same time.

16. Do the coverage maps assume that BGA is changing to a simulcast site? If so, provide coverage maps with no change to BGA.

The coverage maps with no changes at BGA are shown below:

Figure 1: Talk-out Coverage with BGA as multicast – 10 dB in-building

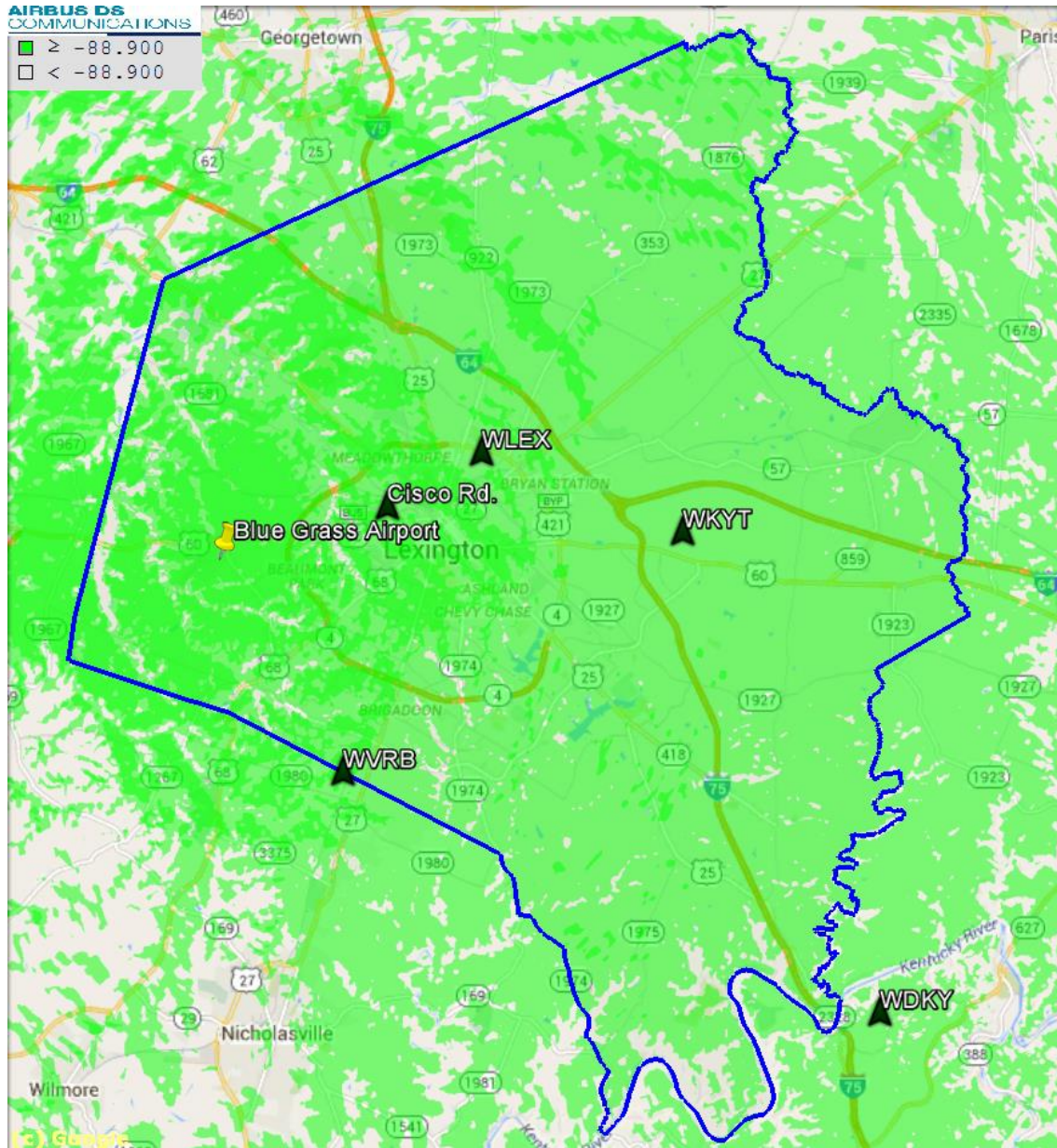
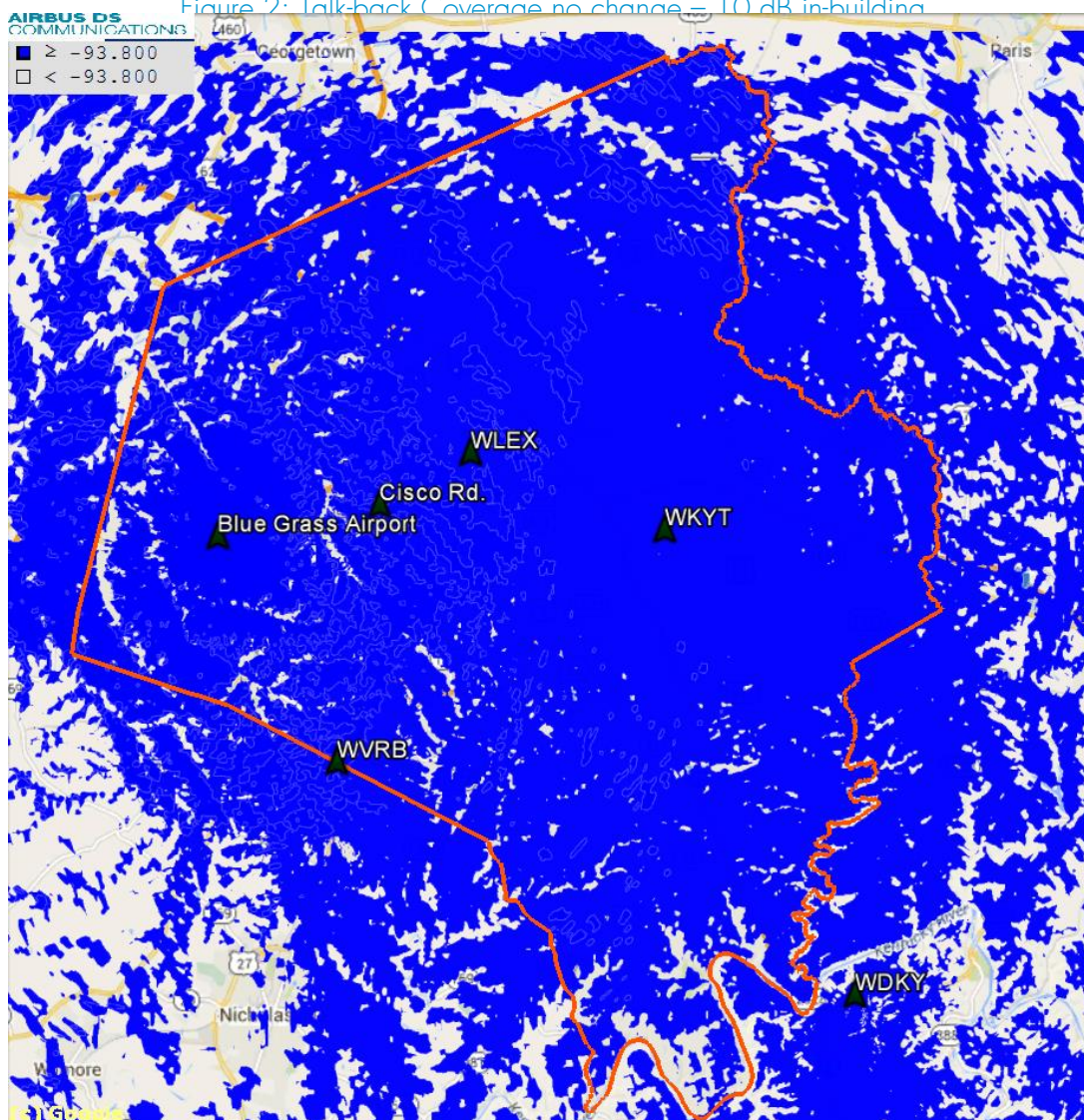
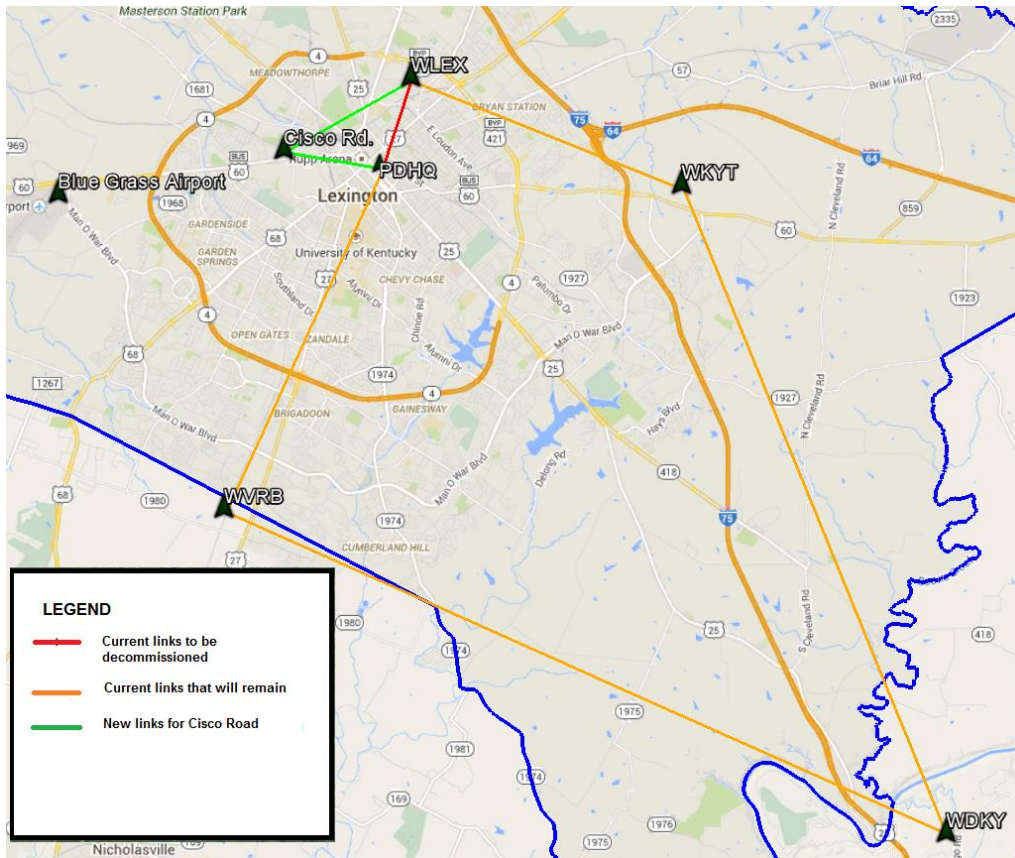


Figure 2: Talkback Coverage no change = 10 dB in-building



17. Confirm microwave proposal without BGA in the loop. The description in Option 2 and Option 3 should be revised to remove BGA for this deployment and confirm that frequency band for the new tower and links.

Below is the microwave topology without the inclusion of BGA in the microwave loop. The WLEX to PDHQ link would be removed and Airbus proposes to reuse the WLEX-PDHQ equipment for the Cisco Road to PDHQ link, provided that the coordinated frequencies are within the same microwave sub-band as the equipment currently installed.



G:/Radio Project/PSOC/Tower at PSOC/Airbus Proposal Clarification Questions

Meeting Minutes – LFUCG Expansion

Location: Webex
Date: 5/1/2015
Time: 09:00 – 10:00

Notes and Actions for Questions:

Question 2:

Proposal includes dual HVAC units, in the shelter; pricing includes running the electrical feed from the building's electrical panel to the shelter. Airbus is providing the breakers, and shelter grounding specs will comply with Motorola R56.

- Action – Airbus will check whether an isolation transformer is needed to be added and get the quote. We will specify electrostatic shielding if needed.
 - Update: Airbus has updated the pricing sheets to include an isolation transformer as an option.

The LFUCG would like to request Airbus to explore the possibility of acquiring a used shelter.

- Update:

Optional Shelter Replacement – Used Shelter

Per the request of LFUCG, Airbus DS Communications has identified components within the secondary-hand market for potential re-utilization and deployment of a used communication shelter for the Lexington PSOC communication shelter. As stock and inventory on the second-hand market is likely to change between the time proposed and the contract award a suitable used shelter will be selected from those available within the budgeted and pricing established and given the following constraints;

The shelter selected is anticipated to meet the following requirements;

- Size: 10'x16' to 10'x20'
- Type: pre-cast concrete, communications shelter
- Interior: VCT flooring and FRP laminated walls and ceiling
- Lighting: minimum of two (2) industrial style strip lighting & one (1) exterior light by the entry door
- Coax Entry: multi-port coax entry portal
- Cable Support: installed overhead ladder rack
- Electrical: 3-phase/208 (if available) / split-phase/240 (likely)
- HVAC: accommodations for redundant wall-mounted HVAC

The following upgrades will likely be required to be performed on-site in Lexington upon shelter deliver;

- Roof: cleaned and treated with an Elastomeric water-sealing roof coating
- HVAC: replacement of existing HVAC units and installation of a new lead/lag controller
- Electrical upgrades: 3-phase/208VAC panel upgrade, new panel surge protection (Transtector APEX series AC Surge Protector) and new outlets for system racks
- Isolation Transformer: if selected from separate proposal

Grounding: minor grounding upgrades to bring the shelter grounding system up to an acceptable level

Smoke Detection: AKCP smoke detector integrated into the alarm aggregator will be provided

Intrusion: AKCP intrusion contact will be added if required

Exclusions:

- All second-hand equipment and components are provided "AS-IS" and furnished without the benefit of Warranty or Maintenance Coverage. New Airbus DS Communications supplied equipment will be supplied with the original manufacturer's standard warranty and will be eligible for Maintenance Coverage.
- Extensive modifications or replacement of shelter systems or components will be quoted separately if determined to be required upon delivery and inspection of the shelter (unlikely but possible). While a reasonable budgeted amount has been included in the Airbus DS Communications pricing for remediation of the shelter given a sample of the quality of shelters currently available on the second-hand to include these costs outright would likely negate the cost advantage of a second-hand procurement.

Question 5:

The proposed tower is constructed of tubular steel.

- LFUCG raised a concern about corrosion if water gets in the tube.
 - The tower is designed with drainage at the bottom of the structure that should alleviate this concern.

Question 7:

Airbus will collect a list of SFEs needed for the Tait control stations and provide them to LFUCG

- A table with the required SFEs is listed below

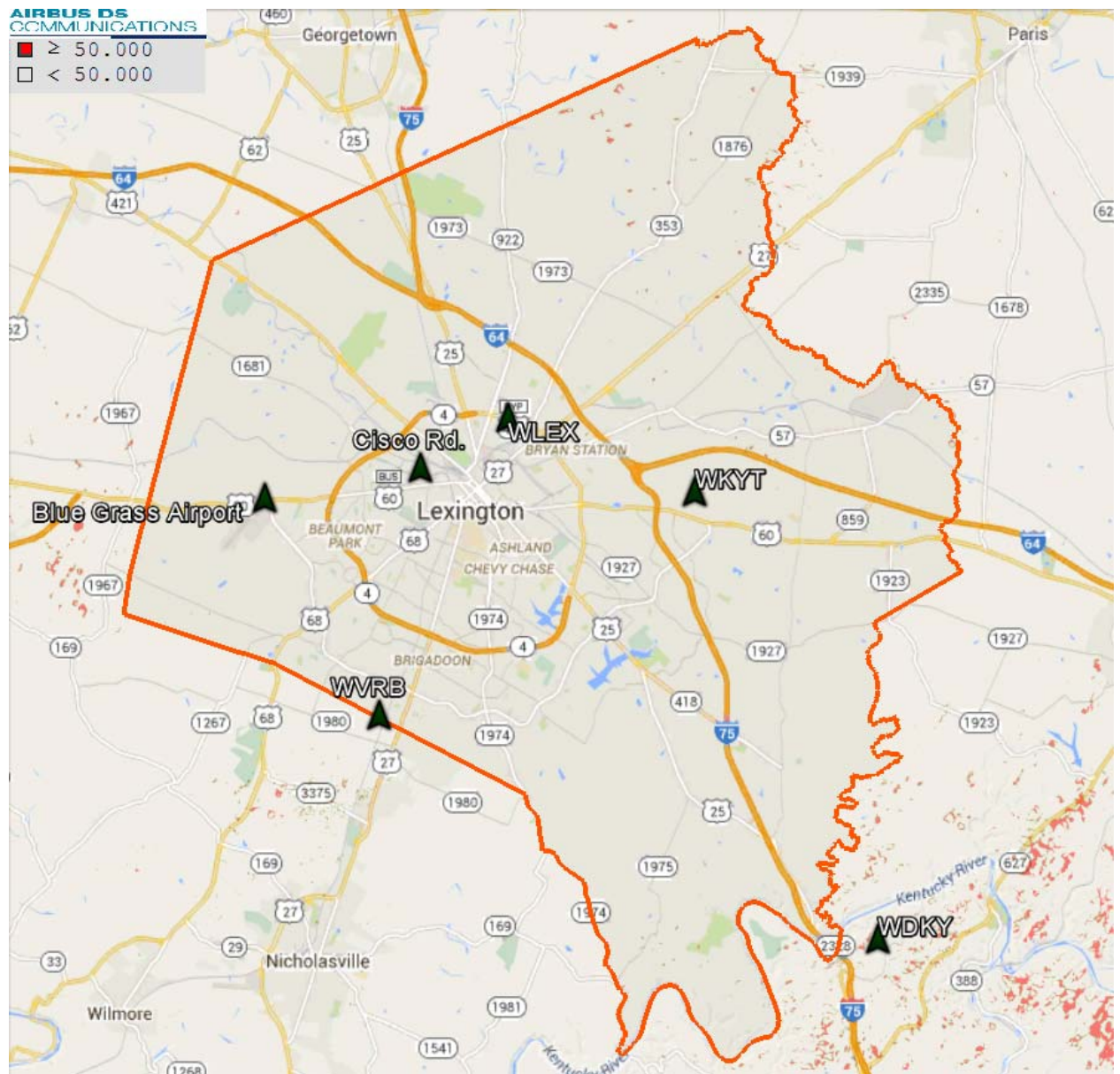
Part Number	Vendor	Description
TM9135-K5C0-AAU0-00BA-10	Tait	Mobile 762-870M BNC Standard Microphone with U-Cradle
TMAS050	Tait	SFE Key - P25 Conventional (CAI included)
TMAS055	Tait	SFE Key - P25 Trunking Service (TMAS050 Prerequisite)
TMAS056	Tait	SFE Key - P25 User IP Data
TMAS057	Tait	SFE Key - DES Encryption and Key Loading
TMAS058	Tait	SFE Key - AES Encryption (TMAS057 Prerequisite)
TMAS054	Tait	SFE Key - P25 Base OTAR
TMAS063	Tait	SFE Key - P25 DLI / Trunked OTAR (TMAS054 Prerequisite)
TMAS051	Tait	SFE Key - P25 Administrative Services
TMAS059	Tait	SFE Key - MDC 1200 Encode / Decode
TMAS065	Tait	SFE Key - Two Tone Decode
TMAS069	Tait	SFE Key - Multi Head Support
TMAS064	Tait	SFE Key - P25 Trunked PSTN Dialing
TMAS060	Tait	SFE Key - Tait Radio API
TMAS015	Tait	SFE Key - GPS Enable + Display
TMAS067	Tait	SFE Key - GPS Transmission (TMAS015 Prerequisite)
TMAA10-03	Tait	External Speaker 10 W for 25W Radio
TMAA03-01	Tait	Install Kit BNC 25W U-Cradle
T02-00061-2003	Tait	Remote Control Head Upgrade Kit with one (1) Control Head Interface Box and two (2) Remote Cables
		Remote Head Upgrade Kit 18 m (60 ft)
TPPK-CH-14X	Tait	Power Pack to power the Remote Control Head
TMAA10-11	Tait	TM9155 Telephone Style Electret

Question 12:

LFUCG will provide the resources necessary to support the DAQ testing of adjacent tiles. The result of the test will be for information purposes only

Question 13:

Airbus will provide a map that includes the expected TDI on the system. The map is shown below:



New questions Dated 4/22

Question 1:

Airbus is providing the electrical services to bring electricity from the PSOC to the shelter

Question 2:

Cutover and decommissioning is not applicable to the move of the consoles because the LFUCG is a live system. Airbus will provide the necessary services to move the console equipment and associated servers to the PSOC.

Question 3:

Site improvements will be changed to site development in the final set of documentation, and associated services will be specified.

Question 4:

Fiber Backhaul – the request from Airbus is to have the fiber connectivity to PSOC be identical to an existing site (such as WVRB). GRE tunneling is not required because PSOC is not anticipated to be a controller site.

Question 5:

Local warehousing of the tower is not required. We only request the ground space to lay the tower materials while working. The Tower Systems crew will be there to erect the tower shortly after receiving the materials and warehousing will not be required.

Additional Actions from 5/1:

- Airbus will move the following equipment from the FD Communications Center to PSOC
 - o VPGates
 - o KVM
 - o One Switch
 - o Consoles
 - Including Transportable Unit
- Leave in place at FD Communications Centre
 - o Relay Panel
 - o Outpost
- We will move from PDHQ to the PSOC
 - o Printer that is currently on the Dispatch Floor
- UKPD will be configured as follows:
 - o Same RFSS
 - o Different NAC to avoid the loading issues currently experienced with BGA
- BGA
 - o Investigate the impact of changing the BGA NAC on the infrastructure and the SU's
 - According to the follow up, changing the NAC on BGA is not a suitable solution. The Airbus DS Communications team will work with the LFUCG during the project phase to find alternate solutions to alleviate this problem.
- What is the Battery Backup in the PSOC shelter?

- The Battery backup included in the Shelter at the PSOC will be identical to the backup system currently in use at one of the standard sites (such as WVRB).
- Confirm that the labelling of the racks will be a “to/from” configuration
 - Confirmed
- Legal structure
 - Is this agreement going to be an addendum to the existing contract?
 - Confirmed – the agreement is to be considered as an addendum to the existing contract
- What are the warranty implications to LFUCG if UKPD moves forward?
 - Warranty for the LFUCG system will not change if UKPD moves forward.
- Confirm that the connection between the site and equipment room at the PSOC location will be a fiber connection
 - Confirmed – the link between the PSOC shelter and the building will be fiber

Lexington PSOC Expansion - Clarification Questions

1. The microwave pricing is dissimilar from the price contract for most items required for the site and has fewer specifics on the parts. Was there a change in the specifications or source of the microwave equipment?
 - The proposed microwave uses the same manufacturer for the additional equipment. The design assumes some reuse of the existing equipment, and is inclusive of all of the necessary material to create a loop that includes the PSOC.
2. The microwave pricing includes a line that isn't in our original price contract for Miscellaneous Installation Materials - \$6,200. Please explain.
 - The "Miscellaneous Installation Materials" refer to the mast we need to install at Park Plaza to increase the Microwave Antenna height
3. The price list includes a Simulcast trunking site controller, Qty. 9, at \$10,300. We were unable to find this item in the existing price contract. Please explain this item or if it is listed under a different name in the existing price contract.
 - The "Simulcast Trunking Site Controller P25 Ph1 trunking license" – SC5000i L023 is a license required for each added repeater to Simulcast Cell. This was not detailed in the existing price contract because it was bundled under the line item called "COR^{P25} S/W Package"
4. The price contract for existing tower sites list a single 8 Channel Ceramic TX Cavity Combiner 700 MHz and 800 MHz (Part# DSCC85-08N). Unit price \$11,252. The proposal for the new site lists two combiners. Are two combiners required at the new site? If so, explain.
 - The second combiner at the PSOC may be removed to match the current configuration at each of the existing sites. The second combiner was included with expansion in mind. Should the LFUCG decide to remove the combiner, the final price will be reduced by \$11,252.
5. The price contract for existing tower sites list a single Router 2911 (Part# CISCO2911/K9), Unit price \$2,054. The proposal lists two routers at the same unit price. Are two routers required at the new site? If so, explain.
 - During the project phase the design was changed to include two routers at each site to better support the microwave and the Windstream configurations. As such the PSOC was designed to replicate the existing sites.
6. The price contract for existing tower sites list a single Cisco SmartNet NBD 8x5, Unit price \$504. The proposal lists two devices at the same unit price. Are two Cisco SmartNet devices required at the new site? If so, explain.
 - The SmartNet line item is the support and warranty for the proposed Cisco routers. The expansion proposal includes two routers to match each of the existing sites, and therefore the associated warranty for both is included.
7. The proposal includes a SecureSync (AC/DC (24 or 48 VDC), OCXO, GPS, 10MHz, 1 PPS output, Item# 1200-213, 1C, 18, 00, 00, 00, 00, Unit price \$7,708. This item doesn't appear on the existing price contract for tower sites. Please explain the purpose of this device and if it appears under a different name and description on the existing price contract.

- During the design phase, the GPS receiver was replaced with the SecureSync because Spectracom discontinued the originally proposed model (the existing price contract included the Spectracom 9383 NTP server with 1 PPS and 10 MHz price).
8. The proposal includes a Spectracom GPS Antenna (Part# HR8540A), which may be associated with Item 7 above, Unit price \$274. We were unable to find this item in the existing price contract. Please clarify.
- The GPS antenna was included in the existing price contract at \$274 unit price. Please see page 7/37 of the cost proposal (for the antenna proposed at WKYT).
9. The proposal includes a P25 Control Station Combiner – 13 inputs (Part# HC113T1 – 13F), Unit price \$13,864. Is it possible to purchase two 8 input combiners under the existing price contract at a Unit price of \$5,724 or is a 13 input combiner required for this installation?
- Yes, it is possible to purchase 2 combiners at a unit price of \$5,724 (total of \$11,448) as a replacement for the 13-input combiner. However, the second combiner will also require an additional lines and antennas. The cost of the additional equipment will make it approximately equivalent to the price of the 13-input combiner.

Separate from the pricing, there are a couple of explanations provided by Airbus that we need clarification on:

- #7 Control Station Radios – Does the code plug occur prior to shipping the CSR's to Richardson, TX or after they are shipped back for installation at the site. The CSR's are currently scheduled to be shipped to Lexington. We're trying to determine when the code plug needs to occur.
 - The TSUs will put the code plug into the CSR when they are shipped to LFUCG directly. They do not need to be sent to Richardson.
- #8 We are waiting on the Park Plaza tower microwave plans to share with the building owner.
 - These plans will be developed during the design phase after the contract signature.
- Tower Specifications:
 - Is there a reason a 4-leg tower is specified? Without adding cost, could a tower with solid steel and three legs be provided?
 - A 4 leg tower was proposed to meet the concern about the tower's close proximity to the building at the PSOC. The specified tower is a solid-leg tower.
 - If the FAA determines that beacon lights are not required on the tower, what credit is provided?
 - We will investigate the cost savings achieve with the removal of the beacon and provide an update.
 - The core drill was completed at the end of the parking lot in the area of the off-set. Please provide a revised site plan showing the location of the tower and shelter.
 - Per the note from Jessica Walker, while the pouring has been completed, the geotechnical report is still outstanding. We have been advised that the report will be provided by 6/5. Once received, we will proceed with the design of the foundation.
 - The time-line indicates that tower construction will occur in February 2016. Given the difficult weather in Kentucky January through early March, is it possible to put tower construction and shelter placement earlier in the project so that it is completed in the range of October/early November 2015. This approach will allow for parking lot paving to be completed in time for substantial completion of the building and avoid damage to the new parking lot during tower

- construction. The entire site will have a perimeter fence and it would be prudent to get the tower up before the fence is installed.
- The tower construction can commence October/November 2015 pending FCC approval.
 - Are you able to advise who the tower contractor is for the project?
 - Based on research done by Airbus, Allstate tower is not an acceptable vendor. Tower Systems is in the process of obtaining quotes from 3 alternate vendors, with the final selection to be made by Airbus in the next 30 days.
 - Microwave:
 - How will the microwave equipment for the link between PDHQ and WLEX be repurposed?
 - The radio infrastructure for WLEX-PDHQ that is being proposed for reuse for Cisco Road-PDHQ is the microwave radios and antennas. New coax/waveguide will be installed on the new link. The reuse plan presumes that the coordinated frequency pair for the Cisco Road-PDHQ link is in the same frequency sub band of the existing WLEX-PDHQ microwave link.
 - It is unclear if the links will be 11 GHz or 6 GHz. Please clarify.
The proposed links will be as follows:
 - Cisco Road-PDHQ 11 GHz
 - Cisco Road-WLEX 6 GHz
 - Shelter:
 - Is the isolation transformer located inside or outside the shelter? Preference is for an outside shielded isolation transformer or located in a separate (unconditioned) room.
 - Yes, the isolation transformer is assumed to be outside the shelter.
 - Will the isolation transformer be shielded?
 - Yes – the proposed isolation transformer will be shielded.