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SITE SURVEY REPORT

PHOENIX, ARIZONA

Prepared By: Curt Squires
Date: September 20, 2011

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2. POINTS OF CONTACT

REPORT DATE: SEPTEMBER 26, 2011

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PROJECT MANAGER: Bradley Bast
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CUSTOMER: ABC Co.
SITE ADDRESS: 200 E. Jones Ave
Phoenix, AZ 85000

SITE CONTACT: Frank Customer
TELEPHONE: 602-555-5555

PRODUCT TYPE: Site Survey Report
CABLE: Category 5e
RADIO TYPE: Motorola Access Port 650
External / Internal Antenna Access Port.

INSTALLATION ENVIRONMENT: Distribution Center consisting of inside warehouse, outside yard (shipping and receiving), shipping, receiving, freezers coolers and offices.

3. OVERVIEW

On September 19-20, 2011 AB&R conducted a site survey for SAMPLE Company at the Distribution Center in Phoenix, Arizona. This survey was conducted to determine the number of access points required for 802.11b/g coverage.

The survey was conducted by placing an access point with a known configuration at the positions being recommended for placement of new access points. Using Fluke Networks AirMagnet, the surveyor conducted a passive survey of the area where the access point was expected to cover plus the area of overlap between access points. Provided below is a site drawing of where the access points shall be installed.

This site survey report contains all of the required specifications to facilitate the installation and implementation of the Micro-Cellular RF Data Communications System. The 802.11bg RF coverage will be at greater than 11mps with 100% coverage and 50-60% overlapping coverage. It was determined that to achieve the above Micro-Cellular RF coverage patterns twenty-four (24) access points will need to be installed at various locations throughout the facility.

The existing MDF and IDF1 are located such that no additional IDF's will be required.

The customer requested coverage in the warehouse, shipping, receiving, freezers, coolers and offices.

4. SITE DESCRIPTION

- The coverage areas consist of : Warehouse, Cooler, Freezer and Office Areas
- The covered area is approximately: 100,000 sq ft
- The floors are: Concrete
- The walls are: Concrete
- The ceilings are: Metal
- The ceiling heights are: 36 ft
- The racking heights are: 30 ft
- Inventory at time of Survey 80%

There are (1) existing MDF and one (1) existing IDF

Survey and Coverage:

The following radios & antennas will be installed:

- Motorola's 650 Access Point – AP650
- 2.4GHz 2dBi Omni Antenna (Inside Coverage)
- 2.4GHz 6dBi Patch Antenna (Outside Coverage)

The Access Points will use the following channels:

- 1, corresponding to a center frequency of 2412 MHz
- 6, corresponding to a center frequency of 2437 MHz
- 11, corresponding to a center frequency of 2462 MHz

5. Warranty of Coverage

The Site Survey results reported here for high rate data rate is warranted by the Seller for one (1) year from Site Survey Report date to provide 100% RF coverage in areas designated by your representative and marked in Attachment C, Site Plan. This warranty applies if the equipment enumerated therein is installed, configured, and tested per this report, and there are no changes to the facility's structure, parameters within the building, or addition of RF device types other than those surveyed for use. Such changes may create the need for an additional survey of the site for an additional fee. This warranty applies only to coverage for those RF device types specified herein; these reflect the device types designated on the Buyer's Site Survey Request form. This warranty is limited to RF coverage and does not provide any explicit or implied guarantee relating to other Network Design parameters; such as, but not limited to: optimum network speed, data throughput, fault tolerance, redundancy, etc.

If any defect within this warranty appears and Buyer notifies Seller within the warranty period, Seller shall take necessary steps to resolve the issue within a reasonable time frame. These steps will include arranging for and performing a new survey of the site. Should this re-survey find coverage shortfalls in the equipment specified, Seller will provide a revised Site Survey report and provide any labor necessary to move existing, and/or install additional, equipment as specified in the revised report. Buyer is responsible for the purchase and provision of any additional equipment required. Should this re-survey find that the system was not installed in accordance with the specifications shown in this Site Survey report, Seller reserves the right to invoice the Buyer at current rates for the time spent in troubleshooting the installation plus expenses.

Surveys for Motorola Wireless Networks can provide data rates of up to 54mb. Achieving 54mb coverage depends greatly on the environment being covered. A department store with a large open sales floor is likely to have most of the area with 11mb coverage. Conversely, a distribution center or a facility with many small rooms will have much less 54mb coverage. Even a department store with a large open sales floor may not be able to get 54mb coverage. Shadows from objects like columns can reduce data rates to 11mb, or even 5.5mb when column is directly between AP and mobile terminal.

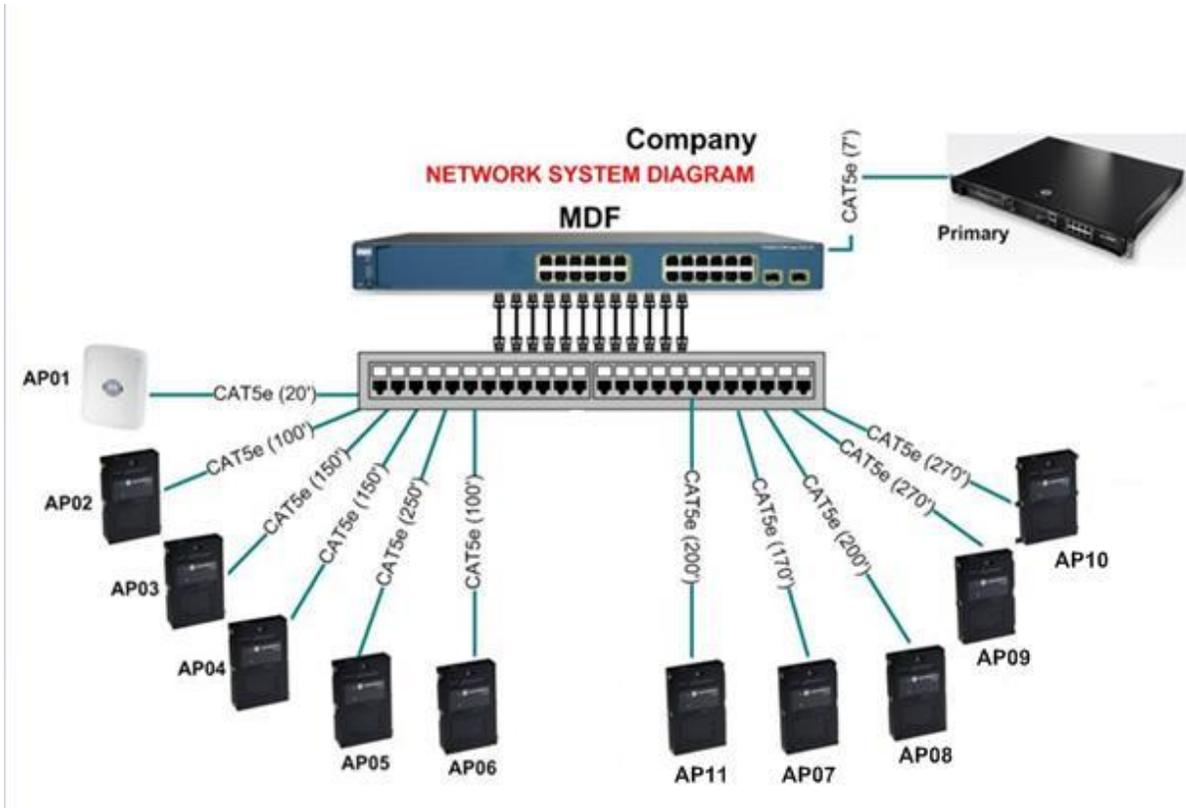
While this makes warranting 54mb and 11mb coverage impossible, the site surveyor will survey for the best coverage possible with coordination from the customer to ensure that too many Access Ports are not used trying to get 54mb coverage.

6. NETWORK OVERVIEW AND RECOMMENDATIONS

- **OVERVIEW:**
 - The MDF is located in a closet in the main office. There is a single open consumer rack-shelf which houses the network switches and network infrastructure components. IDF1 is connected to the MDF via approximately 300ft of 62.5um MM fiber optic cable.
 - The existing non-PoE Cisco Catalyst 2960 switch has seven (7) open ports.
 - The existing patch panel does not have sufficient number of open ports to accommodate the new access points.
 - IDF1 is located in the receiving control office. There is a shelf mounted near a small back board which contains the network switch and network infrastructure.
 - The existing non-PoE Cisco Catalyst 2960 switch has eight (8) open ports.
 - The existing patch panel does not have sufficient number of open ports to accommodate the new access points.
 - The existing wireless coverage is provided by a residential grade wireless switch.
 - All existing cabling is CAT5e.

- **RECOMMENDATIONS:**
 - Add nineteen (19) new Motorola AP650 external antenna and two (2) new Motorola AP650 internal antenna access points as shown on the proposed layout drawing.
 - Utilize 2.4GHz 2dBi omnidirectional antennas for coverage inside the facility.
 - Add one (1) set of Motorola RFS4000 Wireless Controllers, one (1) primary and one (1) failover, to control the new AP650's. One will go in the MDF and the other in IDF1.
 - Two (2) 12 port PoE appliances will need to be installed to provide power to the new access points. One will go in the MDF and the other in IDF1. As the existing Cisco switches do not have enough open ports to support all the additional AP's in either the MDF or IDF, the POE+Network ports on both the primary and redundant RFS4000 will need to be utilized. This will decrease the resilience of the network as a failure of either RFS switch will cause a loss of power to the AP's plugged directly into it.
 - Patch panels will be added to support the additional AP's
 - Any necessary wall penetrations will be sleeved, sealed and fire stopped.
 - All cables will be labeled within 6-12" of the termination point at both ends as a minimum.
 - A 32' scissor lift will be required for this installation.

7. MDF NETWORK SYSTEM COMPONENT DIAGRAM



8. MDF NETWORK SYSTEM COMPONENTS

AP # AP01
AP Model: Motorola 650 Access Port – Internal Antenna
RF Channel: 6
Cable Distance: 20 FT, CAT5e
Power By: PoE SWITCH
AP Height: 10 ft
AP Location: MOUNT ON CEILING IN MAIN OFFICE
AP Mounting Surface: MOUNT TO CEILING GRID
Antenna (s) model: INTERNAL TO AP
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 10 FT
Antenna Location: INTERNAL TO AP
Enclosure: N/A

AP # AP02
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 11
Cable Distance: 100 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: 20FT SOUTH OF BREAKROOM
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: ORANGE METAL BACKBOARD

AP # AP03
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 1
Cable Distance: 150 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: 20FT NORTHEAST OF BONDED CAGE
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: ORANGE METAL BACKBOARD

AP # AP04
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 6
Cable Distance: 100 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: IN BONDED CAGE
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: ORANGE METAL BACKBOARD

AP # AP05
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 11
Cable Distance: 250 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: 20FT EAST OF COOLER 1
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: ORANGE METAL BACKBOARD

AP # AP06
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 1
Cable Distance: 100 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: 50FT EAST OF DOOR 1 IN SHIPPING
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: ORANGE METAL BACKBOARD

AP # AP07
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 6
Cable Distance: 170 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: 50FT EAST OF DOOR 10 IN SHIPPING
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: ORANGE METAL BACKBOARD

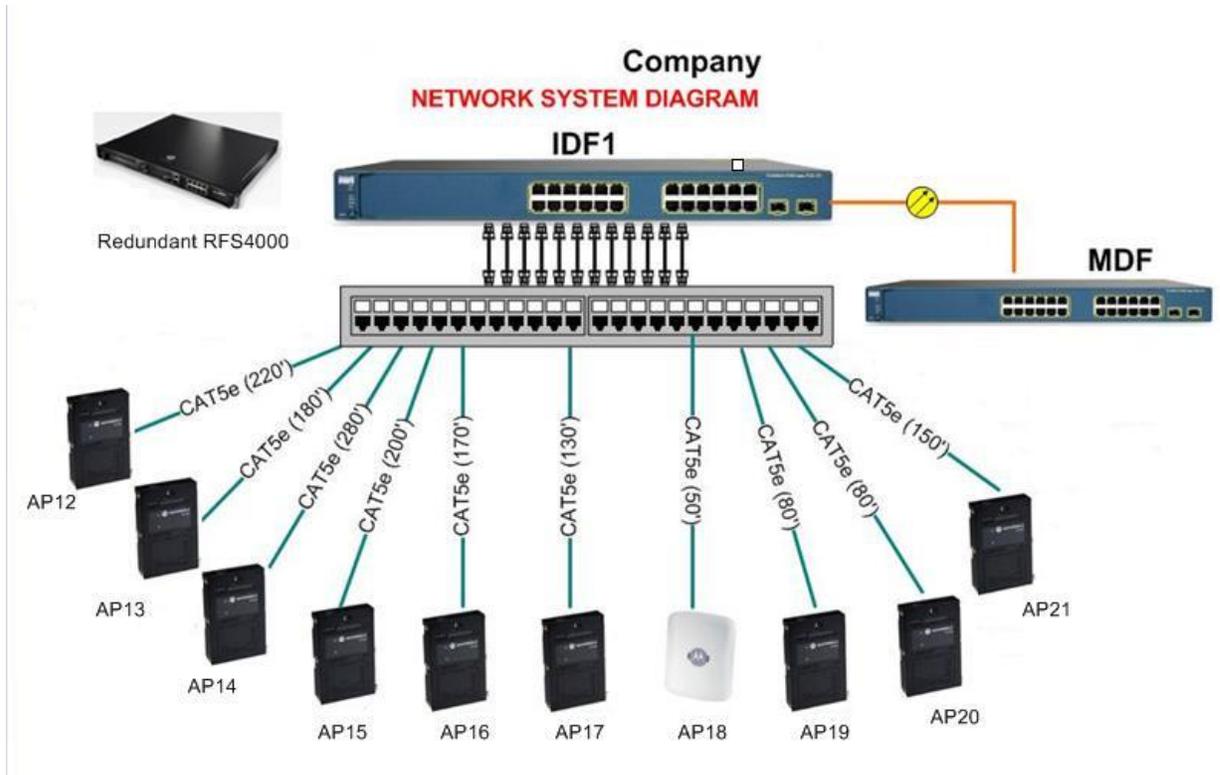
AP # AP8
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 1
Cable Distance: 200 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: IN COOLER 1 NEAR RACK 44
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: NEMA ENCLOSURE

AP # AP09
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 1
Cable Distance: 270 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: IN COOLER 2 NEAR RACK 13
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: NEMA ENCLOSURE

AP # AP10
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 6
Cable Distance: 270 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: IN FREEZER 1 NEAR RACK 34
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: NEMA ENCLOSURE

AP # AP11
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 11
Cable Distance: 290 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: IN FREEZER 2 NEAR RACK 40
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: NEMA ENCLOSURE

9. IDF1 NETWORK SYSTEM COMPONENT DIAGRAM



10.IDF1 NETWORK SYSTEM COMPONENTS

AP # AP12
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 1
Cable Distance: 220 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: IN FREEZER 3 NEAR EXIT
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: NEMA ENCLOSURE

AP # AP13
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 6
Cable Distance: 180 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: IN FREEZER 3 NEAR RACK 1 IN AISLE 21
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: NEMA ENCLOSURE

AP # AP14
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 11
Cable Distance: 280 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: IN FREEZER 3 50FT SOUTH OF EAST MAIN DOOR
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: NEMA ENCLOSURE

AP # AP15
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 6
Cable Distance: 200 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: 20FT NORTH OF FREEZER WALL IN AISLE 9
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: ORANGE METAL BACKBOARD

AP # AP16
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 1
Cable Distance: 170 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP +Location: 20FT SOUTH OF NORTH WALL IN AISLE 7
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: ORANGE METAL BACKBOARD

AP # AP17
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 11
Cable Distance: 130 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: 20FT SOUTH OF NORTH WALL IN AISLE 10
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: ORANGE METAL BACKBOARD

AP # AP18
AP Model: Motorola 650 Access Port – Internal Antenna
RF Channel: 6
Cable Distance: 50 FT, CAT5e
Power By: PoE SWITCH
AP Height: 10 ft
AP Location: IN CONFERENCE ROOM BEHIND IDF1
AP Mounting Surface: METAL
Antenna (s) model: INTERNAL TO AP
Orientation: N/A
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO CEILING GRID
Enclosure: N/A

AP # AP19
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 1
Cable Distance: 80 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: 50FT SOUTHEAST OF IDF1 IN AISLE 11
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: ORANGE METAL BACKBOARD

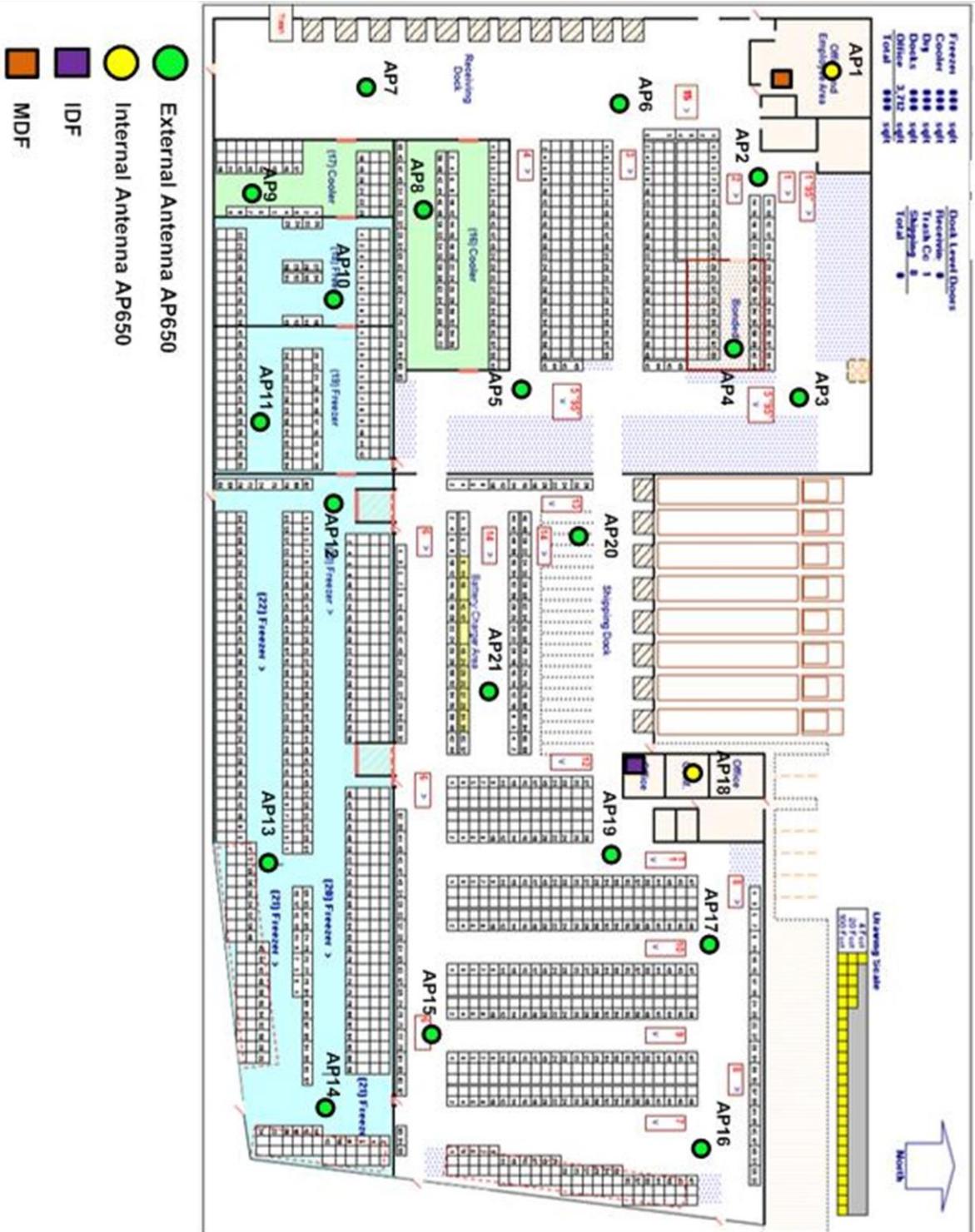
AP # AP20
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 6
Cable Distance: 180 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: 50FT SOUTH OF DOOR 19 IN RECEIVING
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: ORANGE METAL BACKBOARD

AP # AP21
AP Model: Motorola 650 Access Port – External Antenna
RF Channel: 11
Cable Distance: 150 FT, CAT5e
Power By: PoE SWITCH
AP Height: 36 ft
AP Location: IN THE MIDDLE IF AISLE 14 NEAR SKYLIGHT
AP Mounting Surface: METAL
Antenna (s) model: 2.4GHz 2dBi OMNIDIRECTIONAL
Orientation: DOWNWARD
Diversity: YES
Antenna Height: 36 ft
Antenna Location: MOUNT TO BOTTOM OF TRUSS
Enclosure: ORANGE METAL BACKBOARD

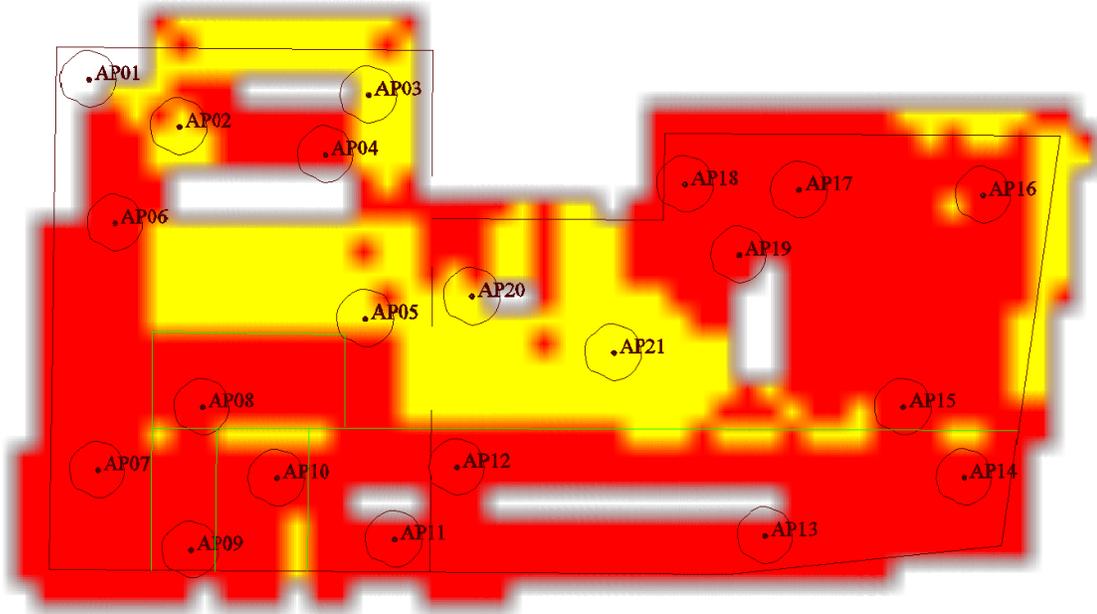
11. REQUIRED PARTS LIST

QTY	DESCRIPTION	MODEL
2	Motorola RFS4000	RFS-4010-00010-WR
2	Motorola RFS4000 AP License Upgrade	RFS-4000-6ADP-LIC
19	Motorola AP650, Access Point Single Radio External Antenna	AP-0650-60020-US
2	Motorola AP650, Access Point Single Radio Internal Antenna	AP-0650-60010-US
2	12-Port POE midspan injector	PD-3512G
36	Dualband rubber duck antennas	ML-2452-APA2
21	2.4 GHz omni antennas	T24050
7	12x12x6 NEMA enclosures	E989R

12. PROPOSED LAYOUT



13. COVERAGE HEATMAP



Signal power (dBm)



14. CABLE AND MOUNTING GUIDELINES

Access Point Mounting:

- In all instances, the Access Points will be mounted using the proper mounting kit.

Antenna Mounting:

- Antennas will be mounted according to manufacturer's specifications.
- Each antenna will be mounted 2-3 ft from the Access Point using stand-off brackets.

Equipment and Cable Support:

- All cables will be supported at periodic intervals.
- All components in the system will be securely mounted to suitable structural supports.
- These devices will be installed to facilitate ease of access for connections and maintenance purposes.
- During placement of system devices, chief considerations will be given to safety hazards and security of equipment.
- Upon completion, all work areas will be returned to a clean and debris-free condition.

Identification:

- All devices in the system will be appropriately labeled with an easily legible identification tag affixed to its housing or surface.

Anchors and Support:

- Cabling, conduit, beam and "C" clamps will be used for anchoring and supporting cable to beams, walls, or flooring as required.
- Clamps and supports will be installed as specified by the manufacturer's mounting specifications.
- Attachments will be made to the permanent building structure.
- At no time will attachments be made to existing conduits or suspending ceiling supports.

Power Requirements:

All equipment should be powered from a dedicated 24 hour, 120 VAC, 20 Amp circuit controlled by its own breaker within the breaker panel. A filtered uninterruptible power source is preferred and recommended, if available. Electrical boxes should be mounted facing up so that the transformer may be plugged in from the top with the weight of the transformer resting on the workbox. The transformer should also be tie wrapped to the electrical workbox.