MOJIX STAR 3000 SYSTEM INSTALLATION MANUAL
RELEASE 2.2.X

CONTENTS

FIGURES

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REVISION CONTROL

Revision	Date	Author: Description
2.2.X-1.0.0	07/25/2011	Paul Barriga: Initial
2.2.X-1.0.1	08/23/2011	Paul Barriga: Added network setup
2.2.X-1.0.2	08/23/2011	Paul Barriga: Updated STAR power supply and bracket details
2.2.X-1.0.3	02/29/2012	Paul Barriga: Update FCC Statement on Page 43
2.2.X-1.0.4	03/06/2012	Paul Barriga: Added FCC Statement on Page 44
2.2.X-1.0.5	04/18/2012	Paul Barriga: Corrected zone coordinates descriptions
2.2.X-1.0.6	05/10/2012	Paul Barriga: Updated FCC Statement on Page 43

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SYSTEM COMPONENTS

The Mojix STAR system is a single network element at the enterprise edge. Based on Mojix's innovative distributed architecture, a single system consists of one or more STAR units managing up to 512 low-cost Mojix eNode transmitters. Mojix eNodes provide energy to all passive RFID tags within their specified interrogation spaces, while the centralized, high-sensitivity Mojix STAR reads the resulting tag signals from across the system's potentially vast coverage area of more than 250,000 sq. feet (24,000 sq. meters).

Mojix eNodes: Distributed Transmitters

Mojix eNodes are reliable, autonomously operated RF repeaters designed to excite all EPC UHF Gen2 RFID tags within their designated interrogation spaces. Although excite ranges are dependent on tag sensitivity, they can range to over 100 feet. Each eNode antenna excites all passive RFID tags within its designated interrogation space and includes form factors to accommodate both fixed and mobile infrastructures. eNodes can be deployed as needed to shape discrete, overlapping or contiguous interrogation spaces, including configurations to create virtual fences for securing tagged items.

STAR Receiver: Centralized Read and Control point

The STAR Receiver functions as a single point of data collection, provisioning, control, and integration with enterprise systems. With the ability to detect extremely faint signals and the freedom from conventional RFID’s line of sight restrictions, the STAR receiver works in concert with its satellite eNodes to support one or many business processes across the entire coverage area. The STAR Receiver contains a 1 x 4 array assembly, and digital and RF processing assemblies. The STAR Receiver utilizes classical, fully active, phased array antennas for enabling the visibility into the space dimension. The smart array approach adopted by Mojix is based fully on digital processing techniques, thereby providing very high resolution for estimation of direction of arrival of the signal of interest (SOI), enabling the system to provide accurate location information on the tag position.

Master Controller

The STAR signal processing platform is linked to an edge appliance called a Master Controller (MCON), and communicates via a standard wired Ethernet interface. The MCON can drive an arbitrary number of STAR systems and includes interfaces to the enterprise middleware. In a larger enterprise deployment, multiple STAR domains exist in various locations and can require one or more Master Controllers in a clustered configuration.

STAR: Physical Interfaces

The following picture illustrates the STAR's physical interfaces.

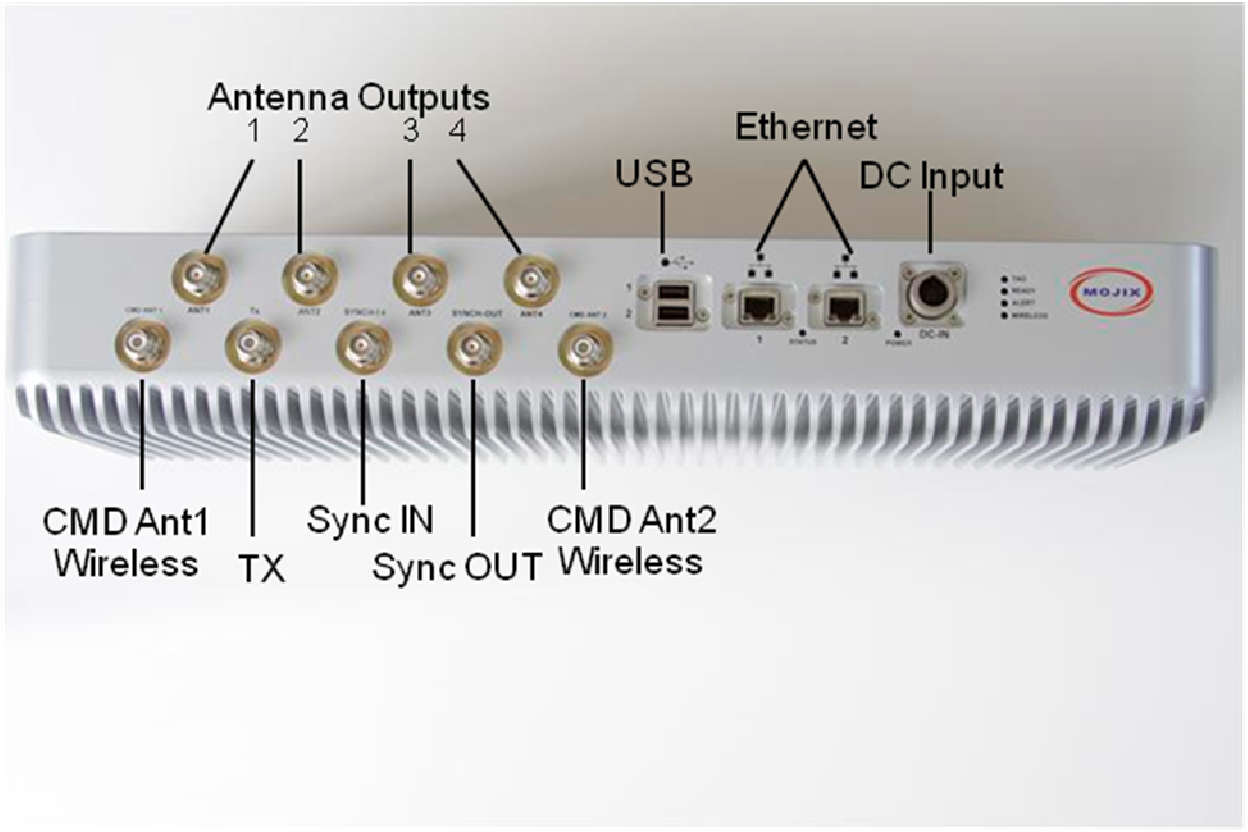


Figure 1: STAR Physical Interfaces

1. 1 TX Output TNC: Transmit RF Signal, 24 Volts DC, Forward Command Signal
2. 2 TX Output TNC for Wireless eNode Network: Up to two wireless forward command antenna(s)
3. 4 RX Input TNC from Antenna(s): Inputs from receive antenna array OR individual receive antenna(s)
4. 1 RX Input TNC Sync: Input synchronization signal from master STAR (for multiple simultaneous receiving)
5. 1 TX Output TNC Sync: Output synchronization signal to another STAR
6. 2 Ethernet Interfaces: Control from MCON, Status Monitoring and Tag Read Packets
7. 2 USB Interfaces (future use)
8. 1 DC Power Connector

Cabled System Topology

Error! Reference source not found. illustrates the components of the STAR system topology. These items are as follows:

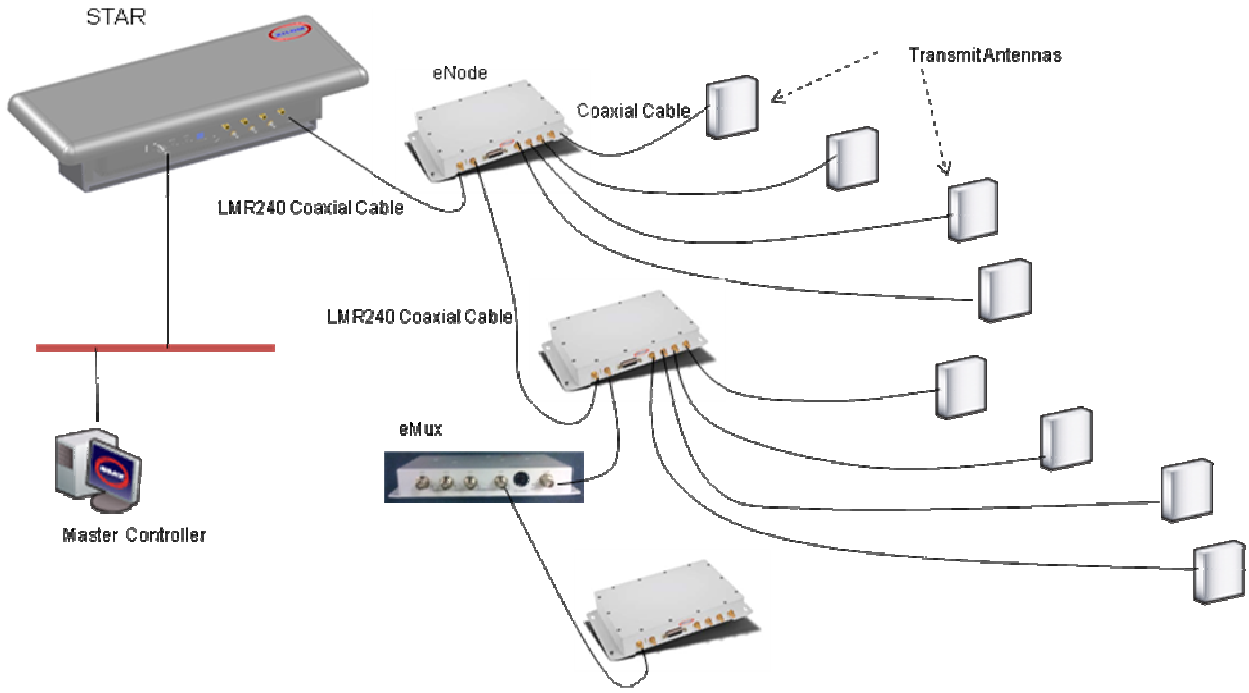


Figure 2: STAR System Topology

SYSTEM COMPONENTS

1. STAR
2. eMux: splitter and amplifier for the RF signal
3. eNode: controls up to 4 antennas to excite tags
4. Master Controller (MCON): application appliance
5. Optional Sensor network to detect activity in specific areas

Wireless STAR System Topology

Figure 3 illustrates Wireless STAR system topology, showing:

1. STAR and power supply, including the command link antenna
2. Wireless 4-port eNode, including the command link antenna
3. Sensor port
4. eNode transmit antennas
5. MCON

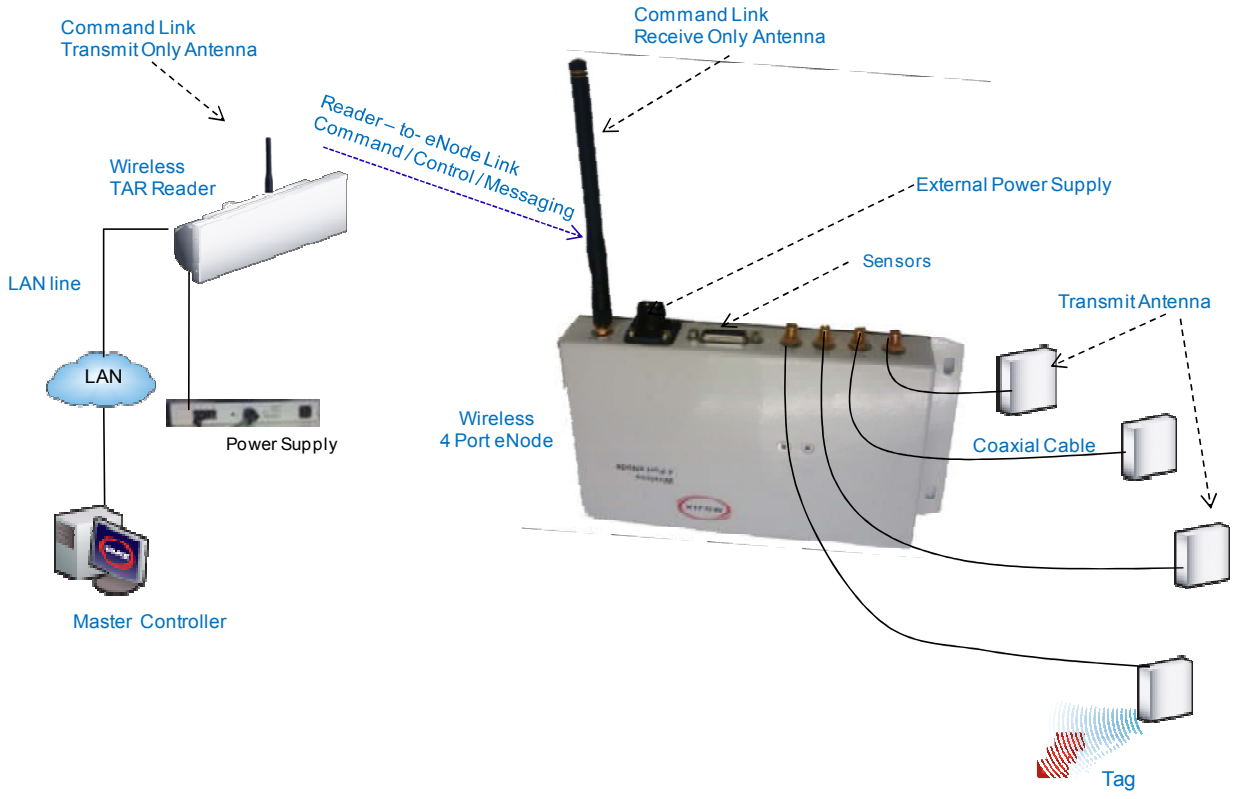


Figure 3: Wireless STAR System Topology

STAR RECEIVER INSTALLATION

STAR Receiver Installation

The STAR is mechanically designed for post or wall mounting. Figure 4 illustrates the rear mounting bracket. This bracket is designed to be used with any standard VESA mounting bracket. As shown in the figure, the mounting bracket is installed directly on the STAR Receiver back plate.

Installation instructions:

1. Product installation shall be conducted by a qualified installer. The appropriate local engineer or architect shall be consulted to ensure the wall and/or pole mount is capable of safely supporting up to 4 times the weight of the product.
2. Should the customer elect to mount the STAR to a flat surface (e.g. wall), holes are provided in the main mounting bracket to accommodate a family of hardware (customer supplied).
3. When mounting STAR unit to a flat surface, a minimum of 4 fasteners are required, though the exact type is a function of the wall material and construction. Best industry practice is recommended.
    a. For example: toggle bolts or Molly bolts would be the first choice on hollow walls. Lead lag shields would be recommended on solid (cast) concrete or brick. Nails are not recommended, but could be used only if the wood material of the wall was at least 1.5" thick.
4. The STAR Receiver is first secured to the main bracket using the provided hardware. A standard VESA bracket designed to hold 4 times the weight of the STAR unit should separately be mounted to either a mast or a flat surface. The last step is to attach the STAR bracket to the VESA bracket.

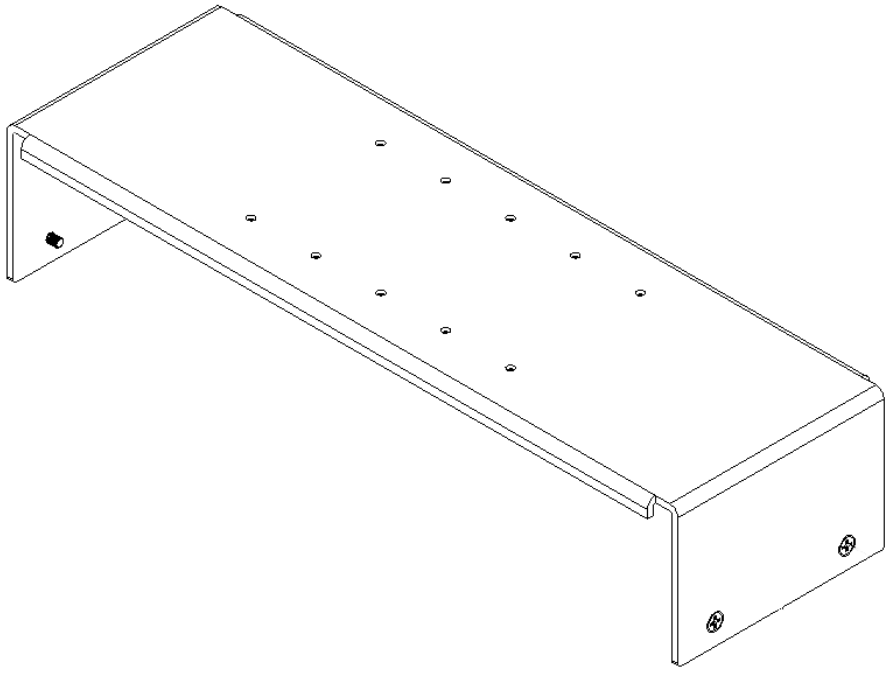


Figure 4: STAR 3000 VESA Interface Mount Bracket

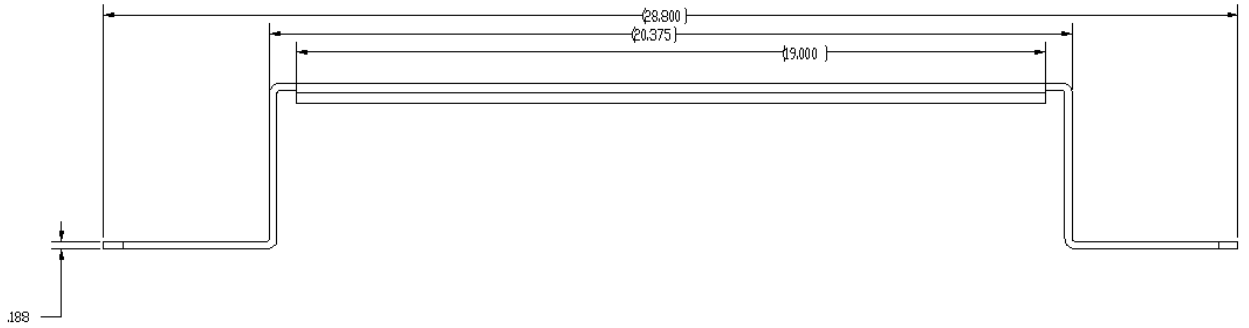


Figure 5: VESA Interface Mount Bracket Side View

Figure 6: VESA Interface Mount Bracket Rear View

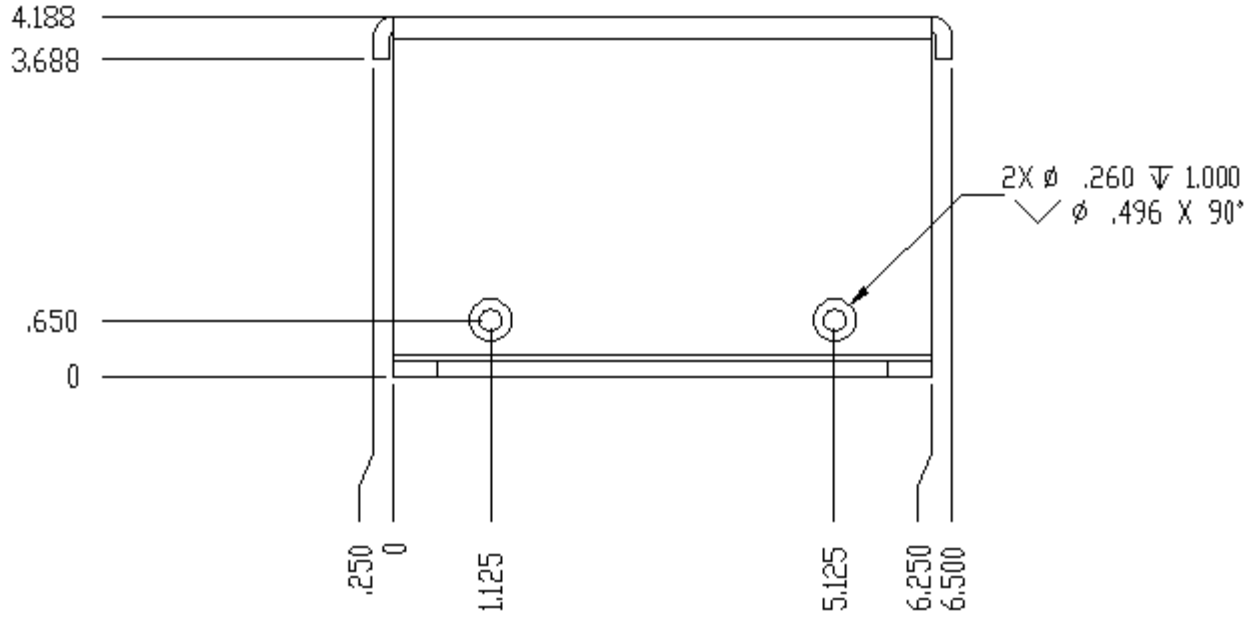


Figure 7: VESA Interface Mount Bracket End Profile View

STAR POWER SUPPLY INSTALLATION

Recommended installation of the power supply is a wall mounted configuration within 20 feet from the STAR Receiver.

Wall Mount Power Supply

Figure 8 shows the power supply with integrated mounting brackets.

Figure 8: STAR Power Supply

The wall mounted power supply requires the following hardware (not included with shipment).

- #6 Drywall (bugle head) or #6 wood screws if the unit is being fastened to a wooden surface
- For a solid wood mount, box nails are a suitable option, provided that the head diameter is more than .28” and less than .30” in diameter and the shank of the nail is at least 2” long.
- For a metal surface mount that is at least .1875” thick, #6-32 pan head machine screws may be used.

- For drywall/plaster fastening, 1/8 Molly or Toggle bolts must be used.

The recommended mounting procedure is:

1. For drywall mounts, "Molly Bolts" are preferred. Alternatively, toggle bolts are a suitable option, as they offer a pull-down force more than 4X the industry standard, and are highly recommended in areas prone to seismic activity.
2. Alternatively for drywall mounts, Bugle-head #6 Drywall screws (coarse thread) are also acceptable, if all 4 tie-down points are used, offering an industry standard of a pull-down strength of at least 4X the weight of the unit.
3. If the wall thickness is at least 1/2" wood (plywood, for example), nails can also be used.

Cables must be properly dressed and supported. Both AC and DC cables should be routed with a service loop and must be supported at least once within 18” of the power supply unit. Cables can be run in conduit, providing (a) the conduit is not hanging on the cables, (b) the service loop exists, and (c) there is at least one support/tie-down on the cables between conduit and power supply.

ENODE INSTALLATION

eNode Cabling

Figure 9 shows the eNode and its interfaces, each of which is detailed in the following table.

eNode Connector Function	Connector Type
RF Input connector	SMA connector
RF Output connector	SMA connector
Antenna – 1 output connector	R-SMA connector
Antenna – 2 output connector	R-SMA connector
Antenna – 3 output connector	R-SMA connector
Antenna – 4 output connector	R-SMA connector
External I/O connector	HD-26

Table 1: eNode Connector Specification

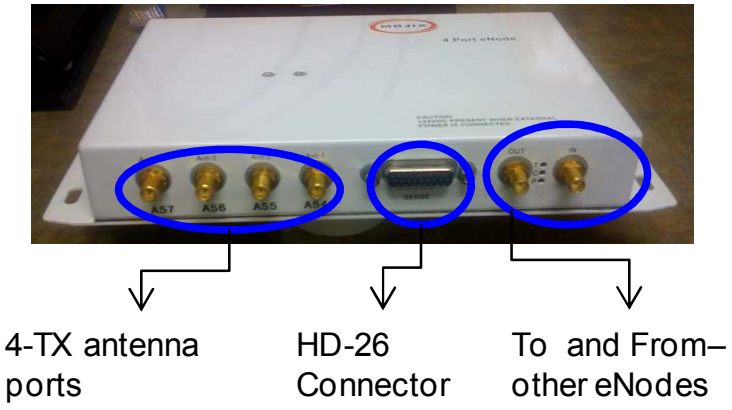


Figure 9: eNode Connector Interfaces

EMUX INSTALLATION

eNodes frequently are deployed with eMuxes that can connect multiple eNodes to a STAR or to another (upstream) eMux. The eMux amplifies and conditions RF signals from the STAR and provides DC power to eNodes. This section describes the steps involved to install an eMux. eMuxes should be used either when:

1. The insertion loss from long lengths of coaxial cables and eNodes is too high
2. The wired eNode system layout requires splitting the wiring to multiple wiring branches

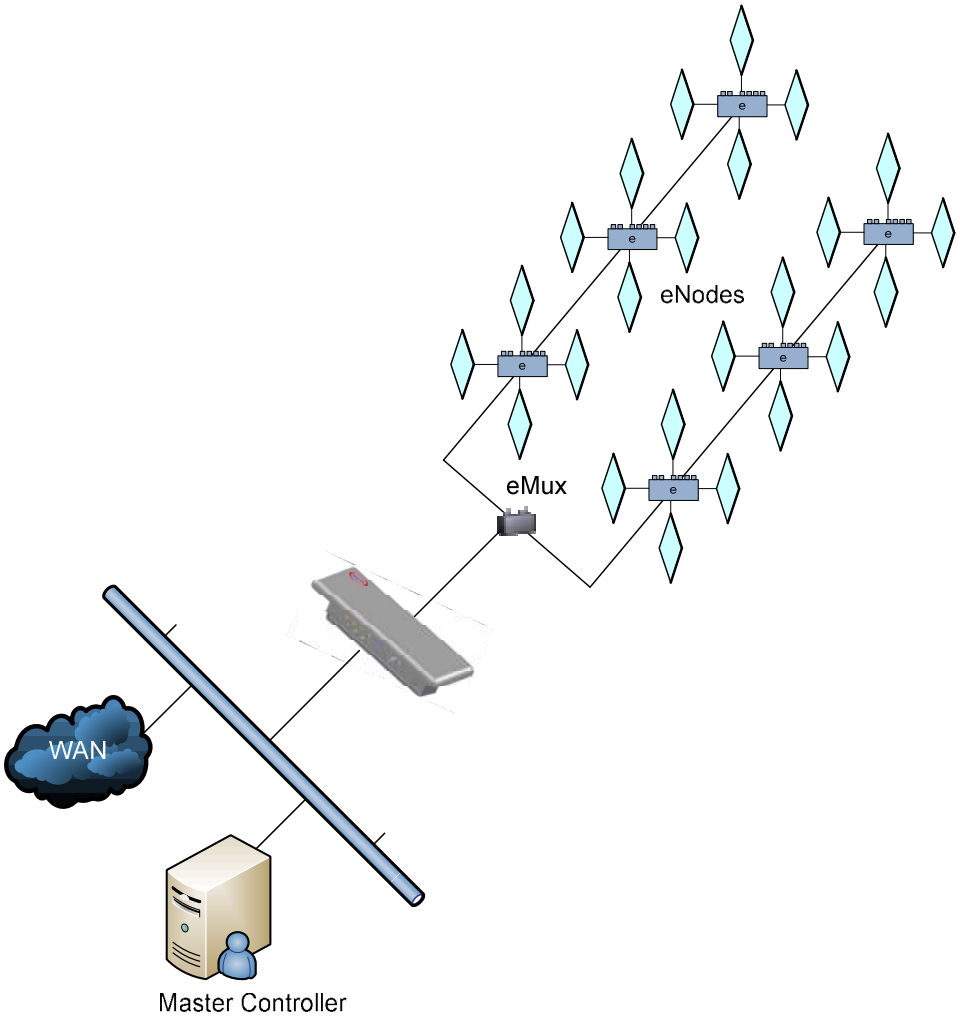


Figure 10: Example Cabling Diagram for eNodes and eMuxes

About Insertion Loss

The STAR transmits a signal of +23 dBm. Insertion loss of terminated LMR240 coaxial cable at 915 MHz is 7.5 dBm per 100 ft. Insertion loss of wired eNodes is 0.5 dBm. Input power level for an eMux must be greater than -10 dBm. The input power level for an eNode must be greater than -5 dBm. In order to increase the signal strength for longer cable runs or many eNodes strung together, an eMux must be

used to amplify the signal. The maximum output level on an eMux for any of the 4 output ports is +20 dBm. The maximum gain of the eMux is 17 dB.

Figure 11 depicts the eMux and its interfaces, showing the RF connections as well as the power supply connection. The connector specification is summarized in Table 2 below.

eMux Specifications

eMux Connector Function	Connector Type
RF input connector	TNC connector
RF output connector – 1	TNC connector
RF output connector – 2	TNC connector
RF output connector – 3	TNC connector
RF output connector – 4	TNC connector
Power Supply Connector	External Power Supply

Table 2: eMux Connector Specification

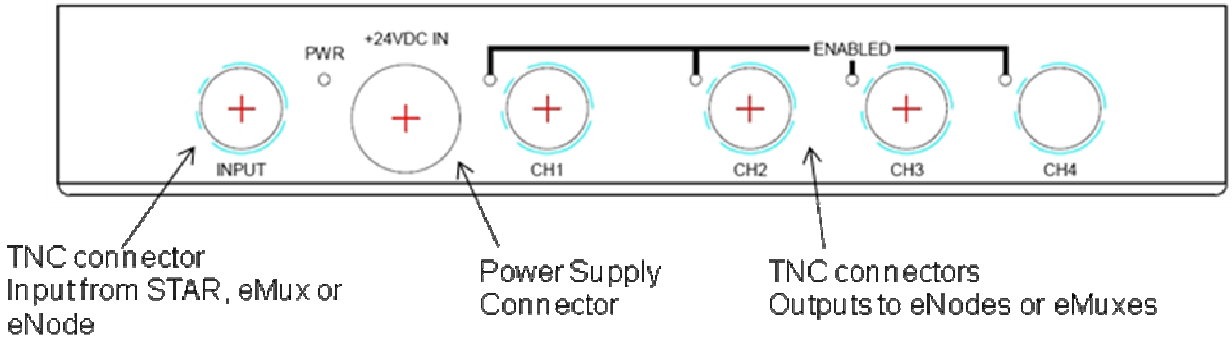


Figure 11: eMux Connector Interfaces

Mojix eNode Multiplexer Specifications	
Parameter	Specification
Signals Present at Input/Output	DC, RF and Control
RF Frequency Range	902-928 MHz
RF Signal Level (Max.)	+20 dBm (output)
Input Connector	TNC
Output Connector	4 TNC's
Input Impedance	50 Ohm
DC Input	24 V
DC Input Connector	Male Power Jack

Table 3: eMux Operating Specification

MASTER CONTROLLER INSTALLATION

The Master Controller (MCON) is a Linux based appliance supplied by Mojix. The hardware is based on the following specifications:

- Memory : 16 GB
- Hard Drives : 6 73 GB Drives in a RAID5 Configuration
- Power Supplies: 2 independent, hot-swappable, minimum 675 Watt AC supplies
- Processors: Two 2.8 GHz Intel Xeon Quad-Core

MCON Deployment Overview

The MCON connects to one or more STARs on a network through its network interface. The MCON commands the STAR(s), collects tag read data, produces RTLS and door transition detection data, monitors the health of the STAR network, and reports data to middleware applications.

MCON hardware must be installed in a temperature and environmentally controlled room.

Redundancy Summary

The Mojix solution includes a robust redundancy capability within the hardware components of the Master Controller (MCON), as well as for automatic failover redundancy of an entire MCON system to another. Internally, the MCON features 6 hot-swap hard drives running in a RAID5 configuration. With this configuration, a single drive can fail without disrupting any MCON functions. Replacement drives need only be inserted in place of the failed drive and the system will automatically configure the new drive.

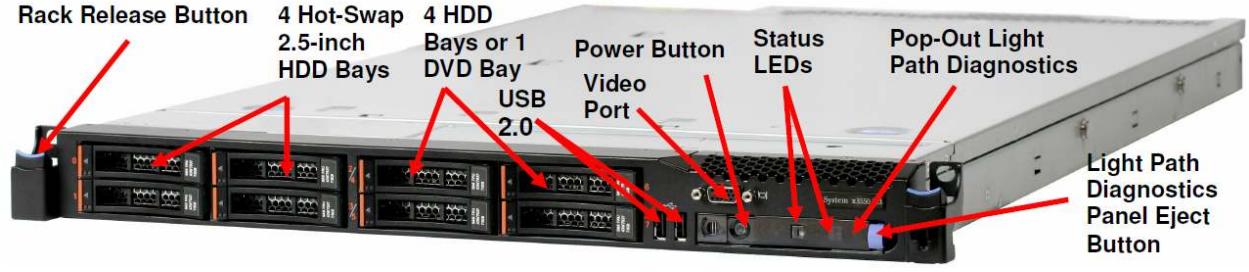


Figure 12: Front Panel of IBM M3 X3550

The system also features hot-swap power supplies. It is recommended that each supply use a separate AC circuit to protect against a possible circuit failure.

Figure 13: Redundant Power Supplies of IBM M3 X3550

Once the MCON hardware is mounted and secured and prior to issuing power to the unit, connect a network cable to the eth0 port as identified in Figure 14. The next step is to power on the unit.

Figure 14: Identification of Network Interfaces

SYSTEM NETWORK SETUP

The MCON has the flexibility to configure and manage the STAR unit through a Web enabled interface called the Web Console.

CONNECTING TO THE MCON

The MCON by default uses DHCP for IP assignment. If a DHCP server is not found within 5 minutes from power up, the MCON uses the following default IP address.

- Default Static IP: 169.254.1.1
- Default Netmask: 255.255.0.0
- Default Gateway: 169.254.1.1

It is recommended to connect the MCON using loopback/crossover cable directly to a windows PC for the initial setup. This will ensure that the MCON defaults to the IP address above after 5 minutes. If the MCON is instead connected to a LAN with DHCP server, it may acquire a different IP address, making it difficult to locate on the network for first time setup.

CHANGING MCON NETWORK SETTINGS

The simplest way to change network settings of the MCON is to navigate a web browser to the MCON's IP address. Use the following credentials to authenticate the connection.

User: edison

Password: p4ssw0rd

Once connected, use the Config menu to select Network. The Figure 15 shows the network configuration screen. The user can choose between dhcp or a static IP address. Once changes are made, click on the Save button. Changes occur within 30 seconds.

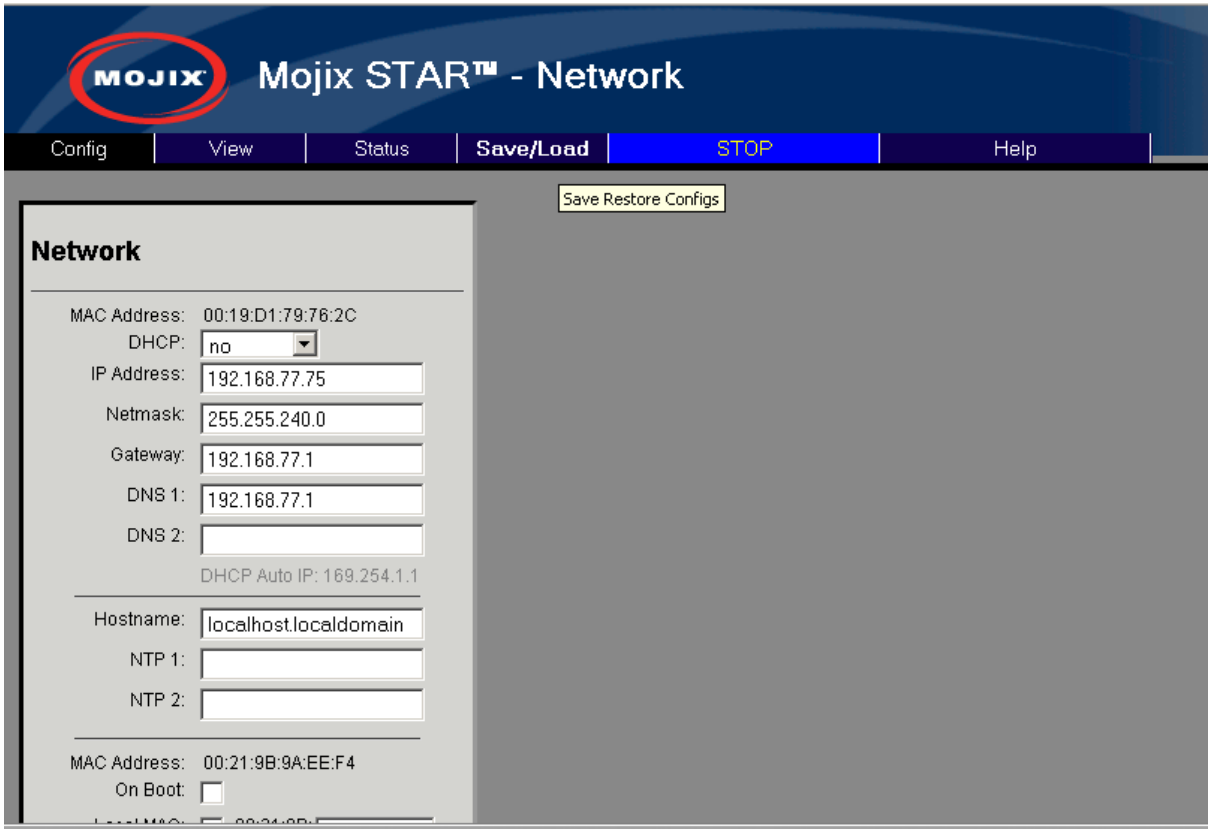


Figure 15: MCON Network Configuration

CHANGING STAR NETWORK SETTINGS

The STAR 3000 uses DHCP for IP addressing by default. If a DHCP server is not detected within 1 minute from power up, then there are 4 temporary IP addresses assigned and remain active for 10 minutes. These addresses are as follows:

- Default Ethernet 1 Address: 169.254.1.10
- Default Ethernet 1 Netmask: 255.255.0.0)
- Default Ethernet 1 Secondary Address: 10.254.1.10
- Default Ethernet 1 Secondary Netmask: 255.0.0.0

- Default Ethernet 2 Address: 169.254.1.11
- Default Ethernet 2 Netmask: 255.255.0.0
- Default Ethernet 2 Secondary Address: 10.254.1.11
- Default Ethernet 2 Secondary Netmask: 255.0.0.0

Network settings are stored in the following file on the system: /mnt/boot/etc/rc.conf
In order to edit this file, follow this procedure:

1. Power on the STAR 3000 with an Ethernet cable connected to Ethernet 1.

2. Method 1: Connect to the STAR by entering the default IP address listed above for Ethernet 1. Figure 16 shows the graphical interace presented to the user for network setup. Enter the desired network addresses and then click on the Commit Changes button.

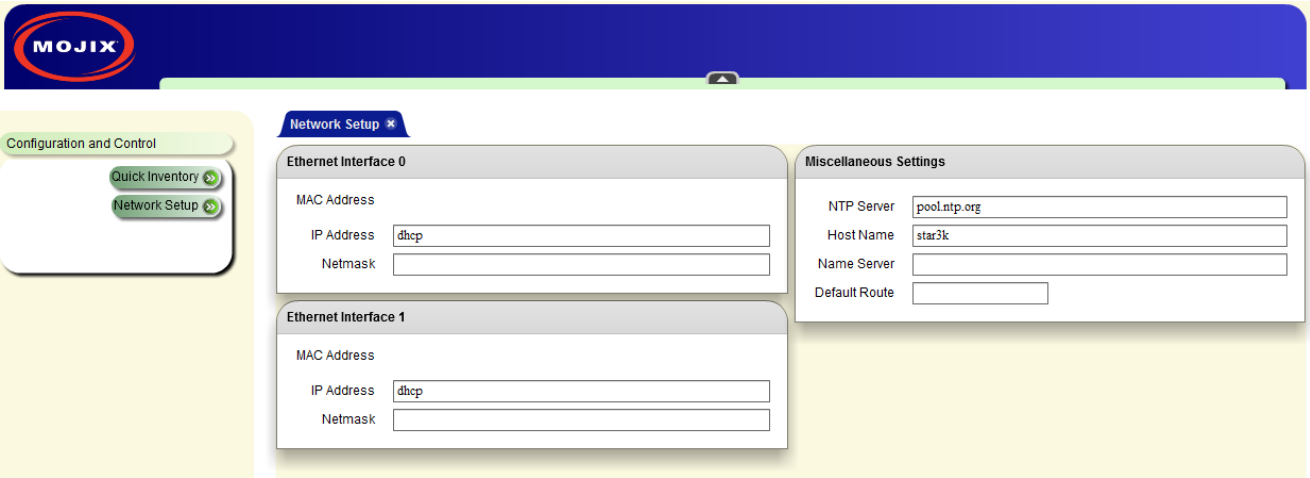


Figure 16: STAR Web UI Network Setup

3. Method 2: Log into the STAR using SSH using the following credentials:

- Username: root
- Password: root
- To edit the configuration file, the user must use the vi editor with the following command:
  - vi /mnt/boot/etc/rc.conf (Note: this is an advanced method of modifying IP addresses and assumes the user is familiar with the basics of the vi editor.)
- The file consists of lines of the format 'export VARNAME="string"
- The variables relevant to network settings for the Ethernet ports are as follows:
  - Ethernet 1 Address: IPADDR0
  - Ethernet 1 Netmask: NETMASK0
  - Ethernet 1 Gateway: GATEWAY0
  - Ethernet 2 Address: IPADDR1
  - Ethernet 2 Netmask: NETMASK1
  - Ethernet 2 Gateway: GATEWAY1
- To set the IP address to DHCP, enter “dhcp” instead of a qualified IP address. If DHCP is used, then there is no need to assign a netmask or gateway.
- To use static IP addresses, the user must enter a netmask and gateway.
- Reboot the system for the changes to take place
  - At the SSH command line, enter the this command: reboot

MCON CONFIGURATION

Graphical User Interface

The Web Console allows the user to configure and run the system. IMPORTANT: the only supported browser is Mozilla Firefox. To connect to the Web Console, enter the MCON IP address in the URL field of the browser. Not all screens are described in this version of documentation. The following screen is the landing page for the system.

Figure 17: Main Web Control Landing Page

From this interface, the user has access to various utilities for configuration and execution of the system. Note that at any time it is possible to return to this screen by clicking on the “Mojix” logo in the upper left corner of the screen. When presented with a Username and password, enter the default credentials as follows:

Username: edison

Password: p4ssw0rd

CONFIG TAB

The Config tab allows for the configuration of various parts of the MCON. It includes the following configuration windows:

- Hardware
- Network
- Email
- Redundancy
- ALE

Hardware Configuration

The Hardware selection opens the configuration screen for the Mojix hardware. This includes the following configuration windows :

- STAR
- Zones
- Sensors
- eNodes

- Advanced Configuration

For additional information about setting up zones and location information, see Appendix A.

STAR Configuration

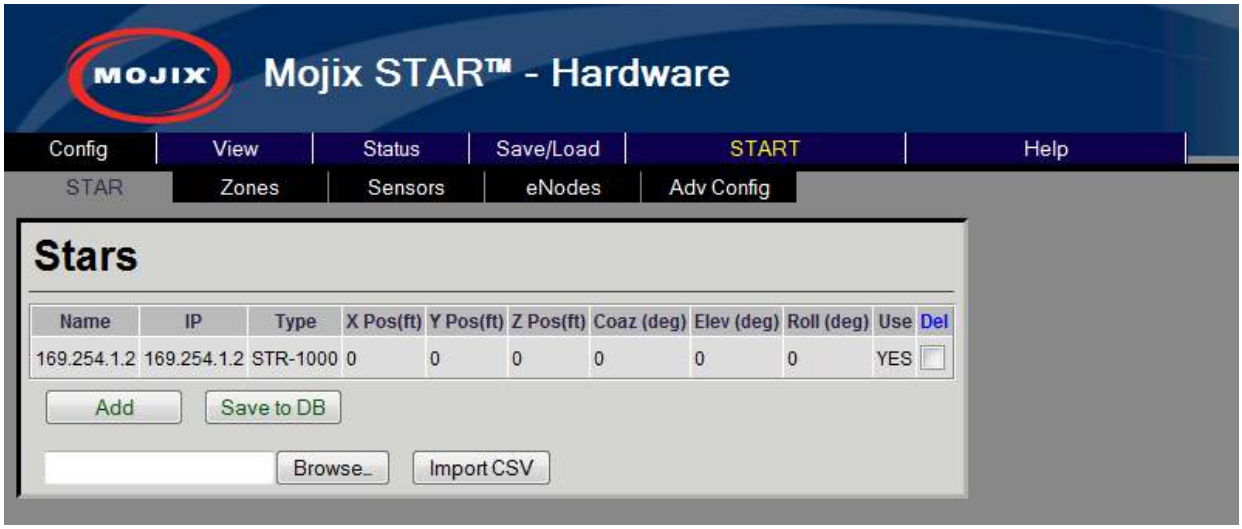


Figure 18: STAR Configuration page

Configuration Item	Description
Name	The name or IP of the STAR is entered in this field.
IP	None editable. This displays the resolved IP address of the entry in the Name field.
X Pos	The X relative position of the STAR
Y Pos	The Y relative position of the STAR
Z Pos	The Z relative position of the STAR. In most conventions this is the height of the STAR relative to the ground.
Coaz	The coazimuth angle of the STAR receiver (angle rotation relative to the X axis)
Elev	The elevation angle of the STAR receiver (angle rotation relative to the Y axis)
Roll	The roll angle of the STAR receiver (angle rotation relative to the Z axis)
Use	If selected this indicates to the Mojix system that this STAR is available for operation.
Del	If selected this row will be deleted on “Save”

Table 4: STAR Configuration

Zone Configuration

The Zone configuration page is used to configure areas of interest as either Dock Doors or Location zone types.

Figure 19: Zone Configuration page

Configuration Item	Description
Name	The name of the Zone (unique name are required)
X Pos	The X coordinate relative position of the zone
Y Pos	The Y relative position of the zone
Z Pos	The Z relative position of the zone.
Type	Configures the operation of the Zone, please refer to Zone Type Descriptions in Table 6
Mode	Configures the mode of operation for the Zone (only applicable in DDD Zone types). Refer to Zone Mode Descriptions in Table 7 for mode descriptions.
Source	Configures the source of the sensor events that may trigger the activation of the zone. Refer to Zone Source Descriptions in Table 8 for source descriptions.
Power Div	Configures the zone to use a power diversity profile specified by the label that is defined in the Power Diversity Configuration page.
Use	If selected this indicates to the Mojix system that this Zone is available for operation.
Del	If selected this row will be deleted on “Save”

Table 5: Zone Configuration

Configuration Item	Description
DDD	Identifies this zone as a Dock Door zone. Objects moving through this zone will be processed by the DDD application
Location I	Identifies this zone as a Location zone. Objects moving through this zone will be processed by the Location application. This zone will be but into the background if any sensor is tripped.
Location II	Same as "Location I" but the group does not go into the background ever (always on).

Table 6: Zone Type Descriptions

Configuration Item	Description
Shipping	This indicates to the system that all events that are triggered by this zone will be leaving the coverage area.
Receiving	This indicates to the system that all events that are triggered by this zone are product that will be entering the coverage area.
Bidirectional	This indicates to the system that events that are triggered by this zone are product that will be entering or leaving the coverage area.
None	Used for Location zones

Table 7: Zone Mode Descriptions

Configuration Item	Description
Internal	This indicates to the Mojix system that sensor events that trigger zone activation will be from internal Mojix sensors.
External	This indication to the Mojix system that sensor events that trigger zone activation will be received externally from the Mojix system through the ALE logical reader interface.
None	Used for Location zones

Table 8: Zone Source Descriptions

Power Diversity Configuration

The Power Diversity configuration page is used to configure a power profile that can be selected on the Zone configuration page. The power profiles are used in conjunction with the Location application to provide greater accuracy.

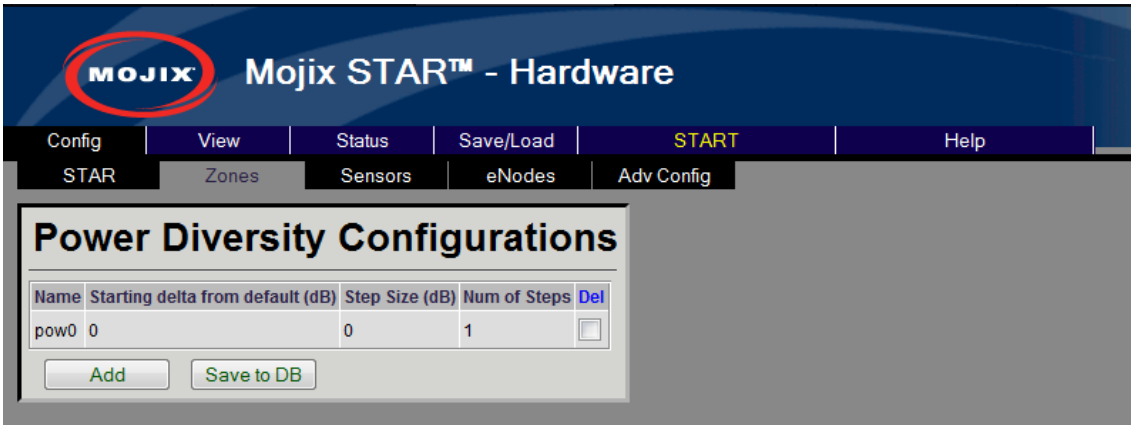


Figure 20: Power Diversity Configuration page

Configuration Item	Description

Name	The name of the Zone (unique name are required)
Start delta from default (dB)	The power profile starts from the power defined in the eNode page plus this delta. All levels are measured in dB.
Step Size (dB)	This indicated how much the power will be adjusted for each step size.
Num of Steps	The configured the number of steps to perform.
Del	If selected this row will be deleted on “Save”

Table 9: Power Diversity Configuration

Sensor Configuration

The Sensor configuration page is used to configure sensors that will be used by the eNodes. Sensors are physically attached to the eNodes and this configuration is done on the eNode page. The Mojix-optical sensor is the only sensor that is not physically attached but still requires a virtual binding to an eNode.

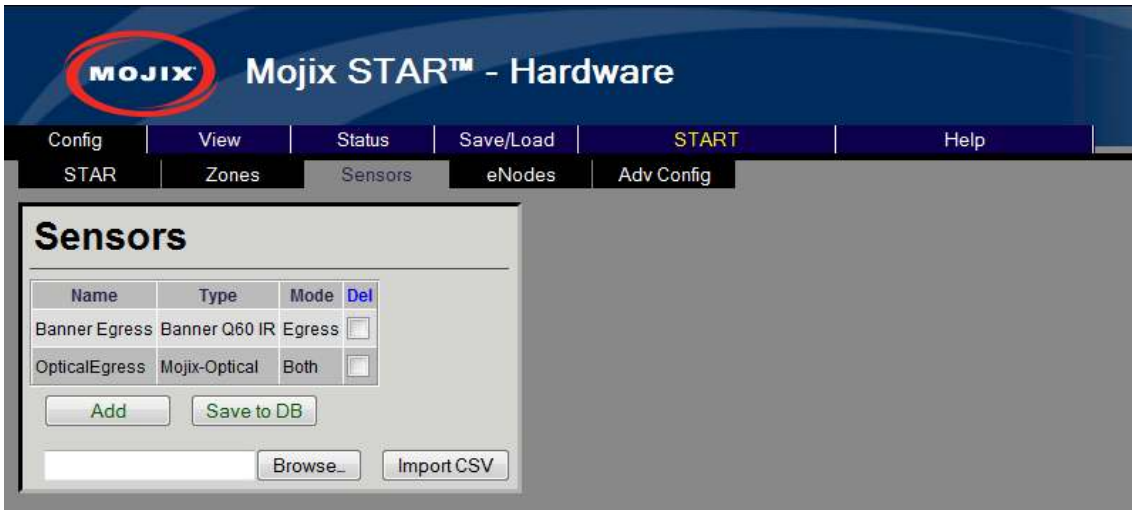


Figure 21: Sensor Configuration page

Configuration Item	Description
Name	The name of the Sensor (unique names are required)
Type	Configures the type of Mojix supported sensors
Del	If selected this row will be deleted on “Save”

Table 10: Sensor Configuration

eNode Configuration

The eNode configuration page is used to configure every antenna on the Mojix system. Due to the potential large size of deployment there is an easy sorting menu to assist in searching and finding the necessary information. The interface supports filtering the information based upon the STAR and/or Zone of interest. The **Total entries** indication is displayed showing the total number of antennas configured.

Figure 22: eNode Configuration page

Configuration Item	Description
Exciter Id	The identification number of the transmitter
Model	The model type of the eNode
Zone	The Zone the exciter ID is associated to
STAR	The STAR the exciter ID is connected to
Config	A configuration template to aid in the configuration entry. The antenna coordinates become editable only when selecting None.
X Pos	The X relative position of the antenna
Y Pos	The Y relative position of the antenna
Z Pos	The Z relative position of the antenna. In most conventions this is the height of the antenna relative to the ground.
Coaz	The coazimuth angle of the antenna (angle rotation relative to the X axis)
Elev	The elevation angle of the antenna (angle rotation relative to the Y axis)
Power	The roll angle of the antenna (angle rotation relative to the Z axis)
Sensor	The Sensor that is attached to the antenna
Staging	Identifies the antenna as a “staging antenna”
Mobile	Identifies the antenna as a mobile or roaming unit. This is only applicable for the wireless eNode types.
Use	If selected this indicates to the Mojix system that this STAR is available for operation.
Del	If selected this row will be deleted on “Save”

Table 11: eNode Configuration

Location Configuration

The Location Configuration provides a mechanism to quickly configure the deployment by defining offsets from the Zone location. When configuring an antenna the location will be the geometric sum of the Zone center location and the defined location configuration.

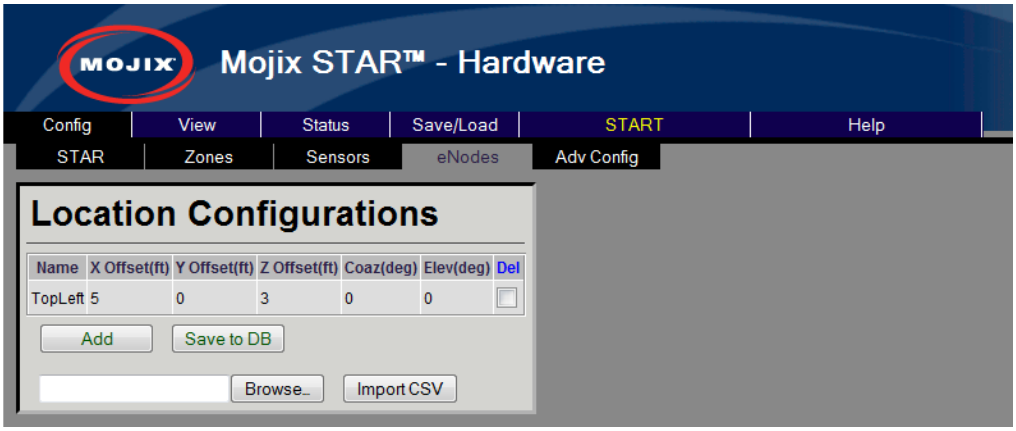


Figure 23: Location Configuration page

Configuration Item	Description
Name	The name of the location template
X Offset	The X offset position of the antenna
Y Offset	The Y offset position of the antenna
Z Offset	The Z offset position of the antenna
Coaz	The coazimuth angle offset of the
Elev	The elevation angle offset of the antenna
Del	If selected this row will be deleted on “Save”

Table 12: Location Configuration

Advanced Configuration

The Advanced Configuration page allows the configuration of several advanced MCON features.

- **System Configuration**
  - **MCON Description**: Provides ability to add a header to the banner. This additional text will be displayed on every page
  - **Units** : System units
  - **Coordinates** : Absolute coordinates of the MCON
- **Hardware Configuration**
  - **Emux Cal**: Performs an eMux calibration on the selected STARs.
  - **Discovery**: Performs a discovery on the selected STARs in the address range specified

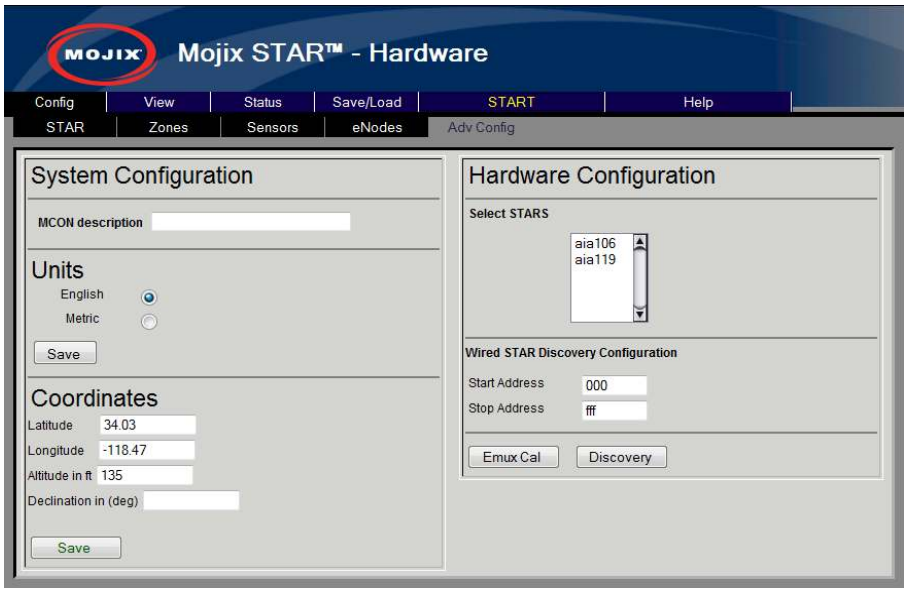


Figure 24: Advanced Configuration page

Network Configuration

The Network selection opens the configuration screen for the MCON's network settings.

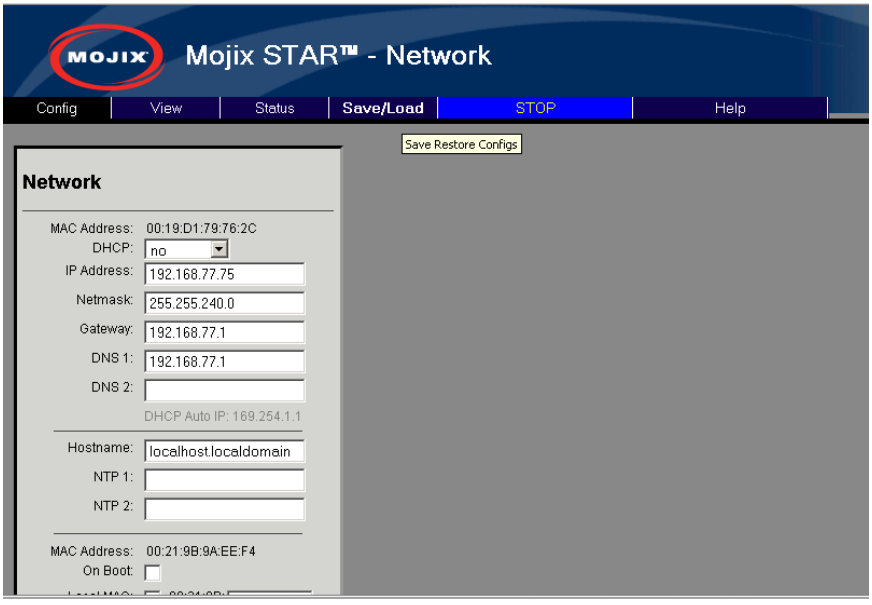


Figure 25: Network Configuration page

Email Configuration

The Email selection opens the configuration screen for the MCON's email settings. Users can enter an email address here where all MCON status report messages should be sent.

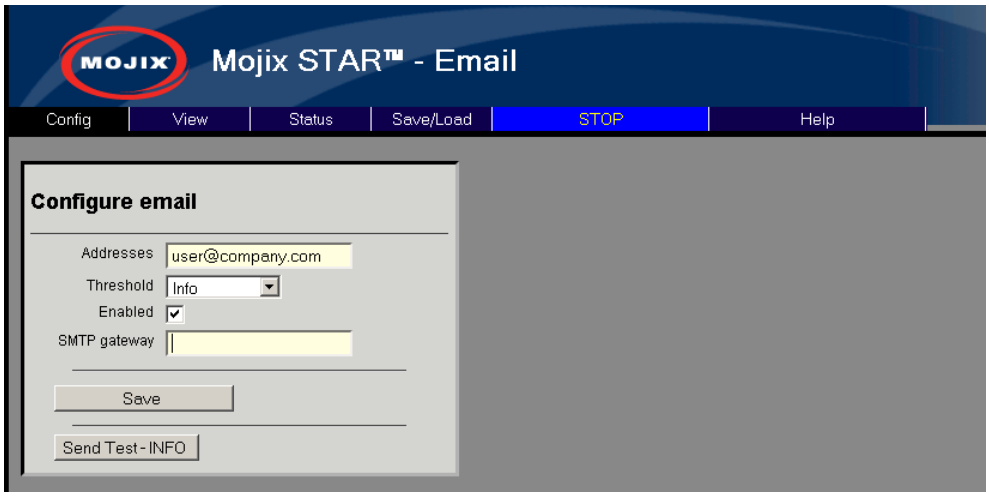


Figure 26: Email Configuration page

Configuration Item	Description
Addresses	List of email addresses that will receive status messages. The list can be separated by a space, comma, or semi-colon. Example : user1@company.com, user2@company.com
Threshold	Sets the minimum email alert threshold that the system will email.
Enabled	Enable selection. When enabled the system is active and sends mail to the configured addresses.
SMTP gateway	Entry for the SMTP gateway. When not configured the system will use the MCON as the gateway.

Table 13: Email Configuration

Redundancy Configuration

The Redundancy selection opens the configuration screen for the MCON's ALE configuration. Redundancy is the ability to detect that MCON elements are going to fail or have failed, and automatically bring backup or redundant resources online. Refer to the Mojix Redundancy Configuration Application Note for detailed information on configuration.

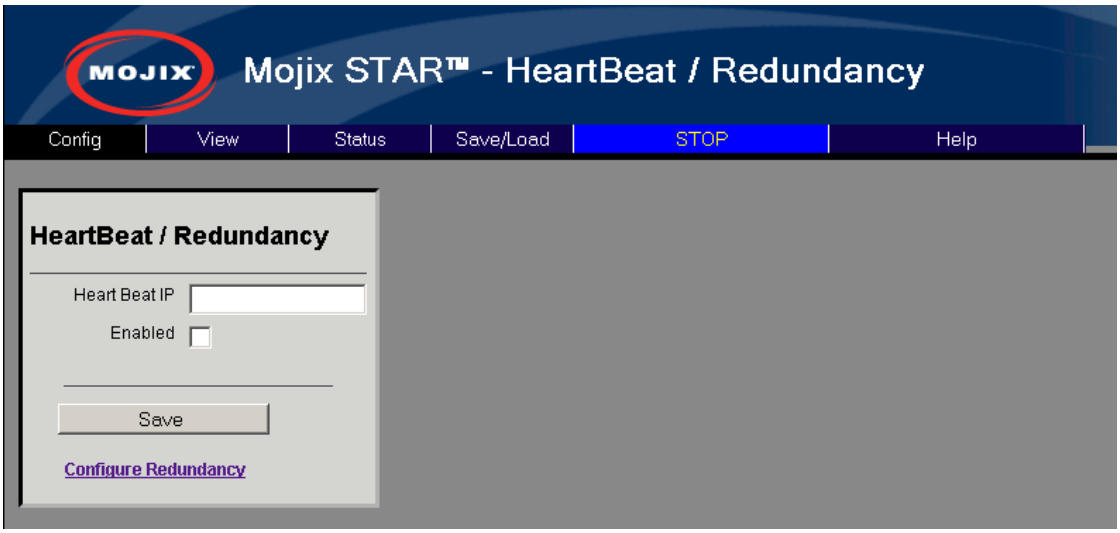


Figure 27: Redundancy Configuration page

ALE Configuration

The ALE selection opens the configuration screen for the MCON's ALE configuration. On this page you can manage ECSpecs currently configured on the system.

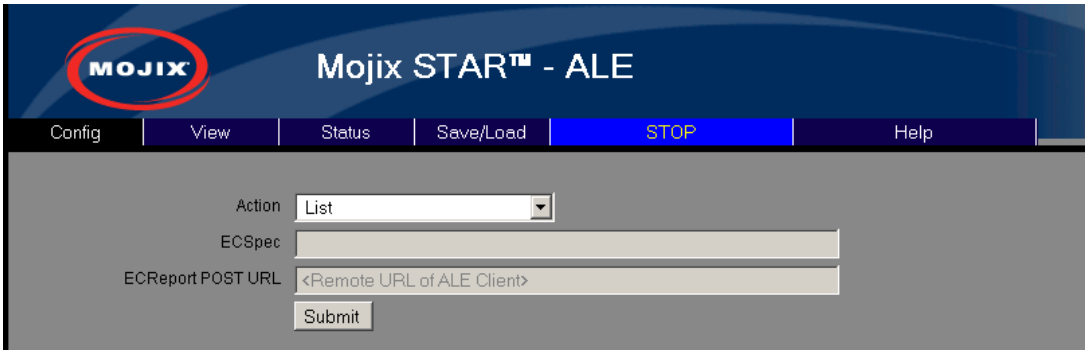


Figure 28: ALE Configuration page

Configuration Item	Description
Action	Defines the specific operation that is desired. The support operations defined below.
ECSpec	Specifies the name of the ECSpec to create or modify
ECReport POST URL	Specifies which URL the ALE reports will be sent to

Table 14: ALE Configuration

Action	Description
List	Lists available ECSpecs for subscription
Subscribe	Subscribes <URL> to <ECSpec>

Unsubscribe	Unsubscribe <URL> to <ECSpec>
(Re)Define Door Spec	Define <ECSpec> for configured zones with Dock Door Type. If the zones are added or changed, a Redefine of the <ECSpec> is required to pick up the new doors.
(Re)Define Loc Spec	Define <ECSpec> for configured zones with Location Type. If the zones are added or changed, a Redefine of the <ECSpec> is required to pick up the new location zones.
(Re)Define HeartBeatSpec	Defines a heartbeat <ECSPec>
Undefine	Undefine <ECSpec>

Table 15: ALE Configuration Action Listing

VIEW TAB

The Topology page is a 2-D graphical representation of the relative locations of the STAR and eNodes configured so far. It is most useful as a check to see if the XY dimensions have been entered correctly. The following figure shows the simple topology of a very basic setup.

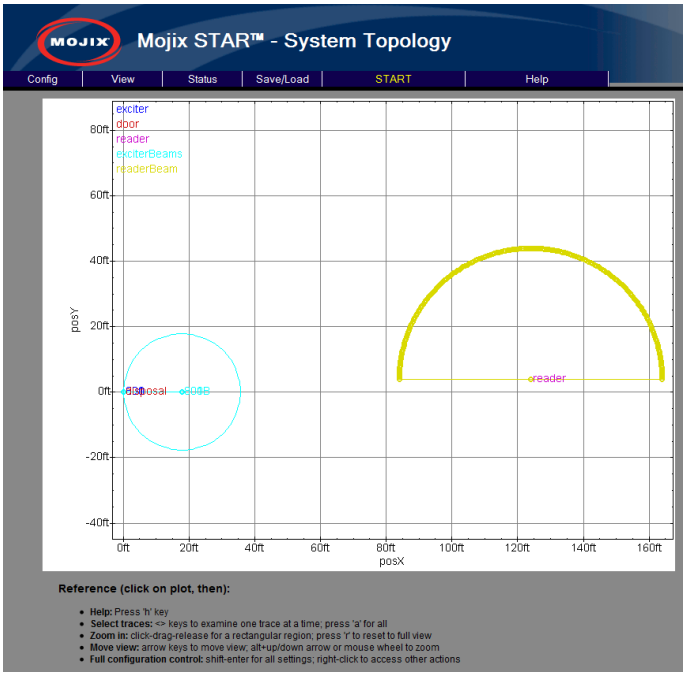


Figure 29: View Topology Page

STATUS TAB

The Status tab provides an interface used to view hardware diagnostics. Pressing the STAR Status button brings up the screen below with the following columns:

- Columns:
  - Name: aiaName of the STAR.
  - Uptime : Time for which the star has been running.
  - Temperature : temperature in degree C as measured by the temperature sensor inside the STAR .

- State : Running/Idle
- Last Known Good : Time stamp indicating the LKG configuration wrt UTC.
- Firmware Version : Current BSP Version on the STAR.

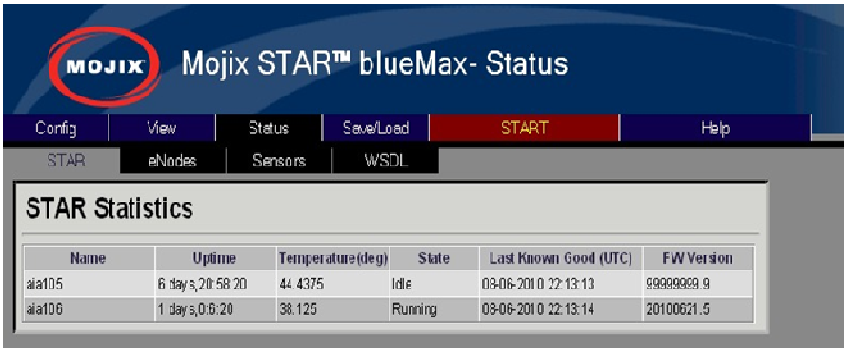


Figure 30: STAR Status

It is possible to now use the lower toolbar to also see status on eNodes, Sensors and WSDL. For example, below screen shows status on Sensors, with the following columns:

- Columns:
  - txID : eNode ID to which sensor is connected.
  - Health : health of the sensor.
  - State : whether idle or tripped .
  - Last Event : Last event of the sensor.
- Sensor Stats refreshed every 3 seconds.

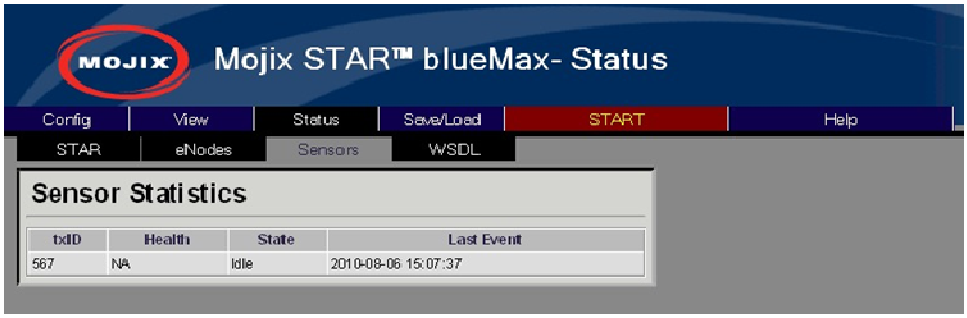


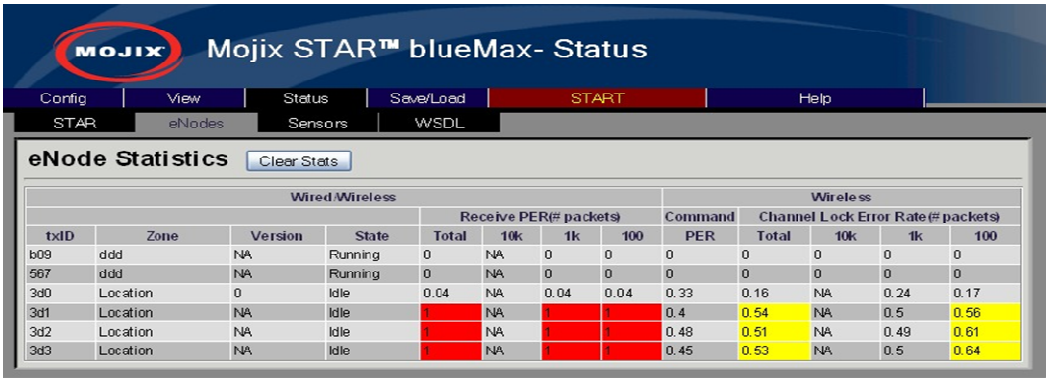
Figure 31: Sensor Status

eNodes status is shown below, with the following columns:

eNodes Status

- PER are measured over different window lengths for both wireless and wired eNodes.
  - Total : Overall packet error rate.
  - 10K – packet error rate computed over the 10k most recent packets.
  - 1k – PER over 1k most recent packets.
  - 100 – PER over 100 most recent packets .
- Command PER and Channel Lock Error rate are applicable only for wireless eNodes.

- Channel Lock Error rate is also measured over Total,10k,1k and 100 packets.
- Color coding used to indicate when error rates cross certain thresholds:
  - Over 50% and less than 90% - yellow
  - Over 90% -red
- Command PER is the PER for our fsk link .
- Channel Lock Error Rate is the error rate for our AFC loop.
- Clear Stats sends a trigger to database to reset it => deletes all database entries.
- Running / Idle state indicate whether the eNode is currently transmitting or not.



Wired/Wireless								Wireless				
				Receive PER(# packets)				Command	Channel Lock Error Rate(# packets)			
txID	Zone	Version	State	Total	10k	1k	100	PER	Total	10k	1k	100
b09	ddd	NA	Running	0	NA	0	0	0	0	0	0	0
567	ddd	NA	Running	0	NA	0	0	0	0	0	0	0
3d0	Location	0	Idle	0.04	NA	0.04	0.04	0.33	0.16	NA	0.24	0.17
3d1	Location	NA	Idle	1	NA	1	1	0.4	0.54	NA	0.5	0.56
3d2	Location	NA	Idle	1	NA	1	1	0.48	0.51	NA	0.49	0.61
3d3	Location	NA	Idle	1	NA	1	1	0.45	0.53	NA	0.5	0.64

Figure 32: eNode Status

SAVE/LOAD TAB

The page allows the user to backup and restore save configurations.

- **Save Configuration** : Save the currently configured system
- **Load/Delete Configuration** : Loads the specified configuration overwriting the current settings
- **Rename Configuration** : Rename the selection to the New Name
- **Import Configuration** : Pushes a configuration saved on your local machine to the MCON. Note : This action does not load the configuration. You will need to select the configuration and load it for it to become active.
- **Export Configuration** : Takes a configuration off the MCON and allows the user to save the file to their local computer.

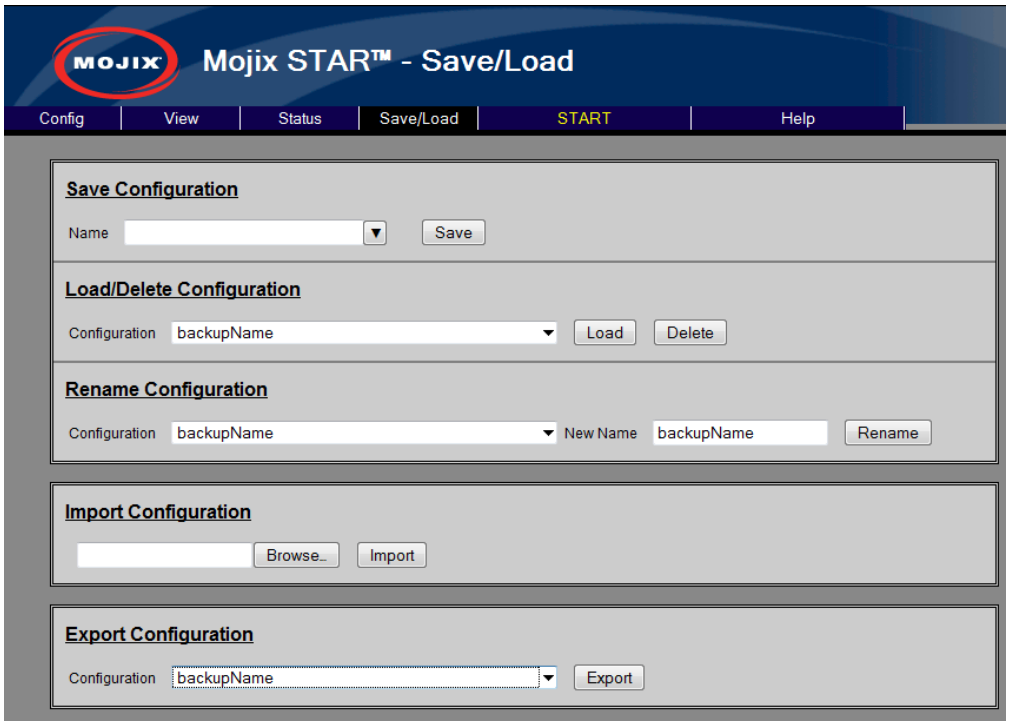


Figure 33: Save/Load Page

HELP TAB

About

This About shows the current version number of MCON software.

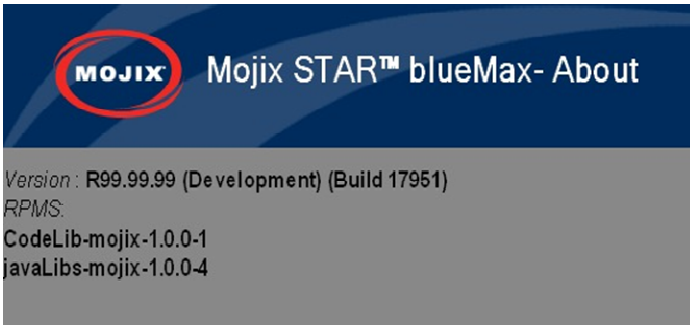


Figure 34: About Page

STAR Upgrade

This page provides the ability to upgrade the STAR with a firmware version supplied by Mojix.

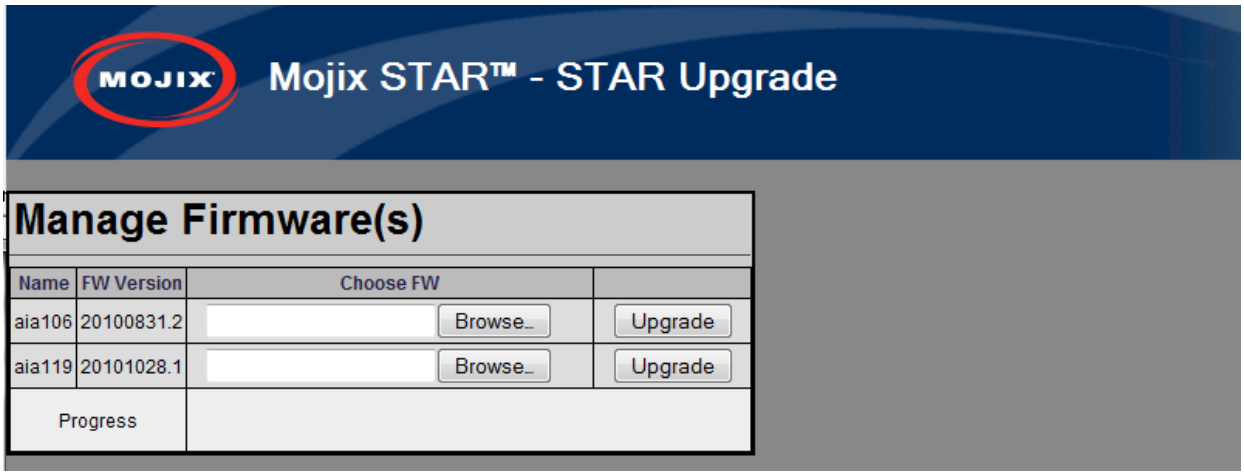


Figure 35: STAR Upgrade Page

APPENDIX A: ENGINEERING INTERFACE - MOJO

Mojo provides users with an integrated interface for both configuration and execution of the system. The functions of this interface are summarized as follows:

- STAR Parameter Configuration
- eNode Configuration
- Inventory Program Generation
- System Operation

To run Mojo, the user must connect to the MCON using VNC and bring up a terminal window by clicking on the Terminal icon on the desktop. With the terminal window open, enter the following command to launch Mojo:

$ Mojo<STAR ip>

This will launch the Mojo application and the user will be presented with the following screen.

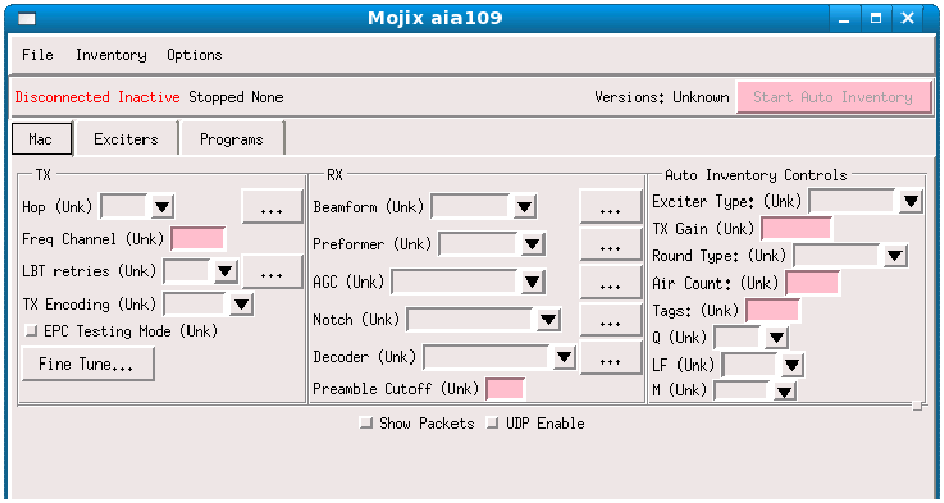


Figure 36: Mojo Main Screen

From here the user must click on the “File” menu and select “Connect”. This will establish a connection between the MojoClient application and the STAR. At this point, the user can make real-time configuration changes. The most basic configuration to begin reading tags would be to enter one or more eNode addresses in the “Exciters” tab as shown in the following figure.

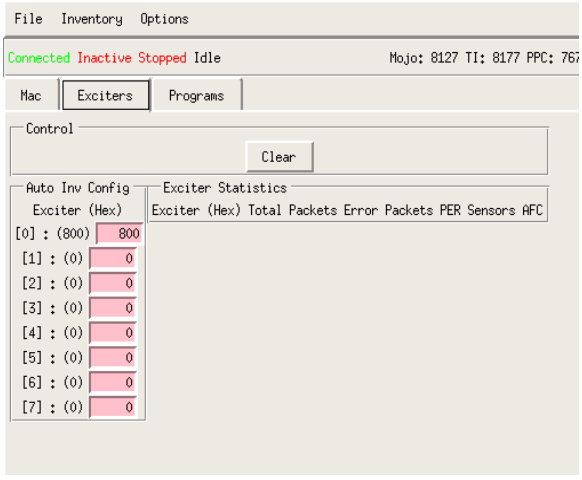


Figure 37: eNode Configuration (eNode Tab)

The address of an eNode is written on the eNode itself as the last three digits of the serial number. The number is presented as three hexadecimal digits, for example, B89. The user must use the Enter key when entering the eNode addresses in this window for the values to be accepted. Note, when the value is accepted it will appear in parenthesis to the left of the text entry box.

Once the eNodes are entered, the user can return to the “Mac” tab and click on the “Start Auto Inventory” Button in the top right corner. The Button will turn green when the system is running and the Button text will change to “Stop Inventory”. This is how to start and stop tag reads. To view tag reads, the user must select the “Show Packets” check box as shown in the following figure.

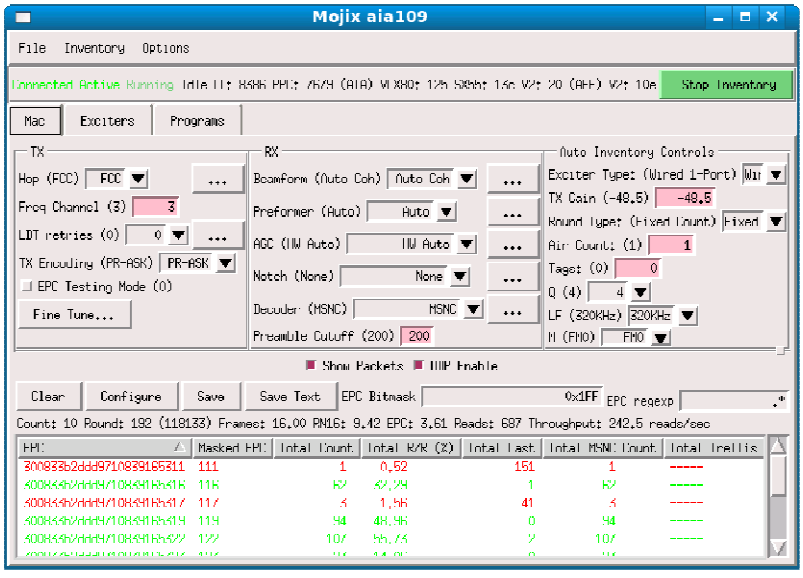


Figure 38: Tag Reads

Note that selecting the “Show Packets” box will redirect tag reads away from the MySQL database and to the Mojo interface for display. Unselecting the box will return tag reads to the database. The EPC display area at the bottom of the Mojo screen shows active tag reads.

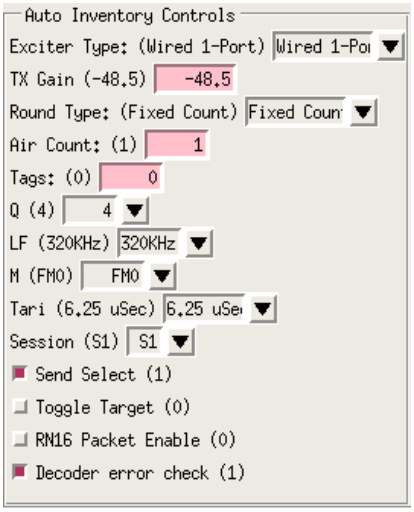


Figure 40: Auto Inventory Controls

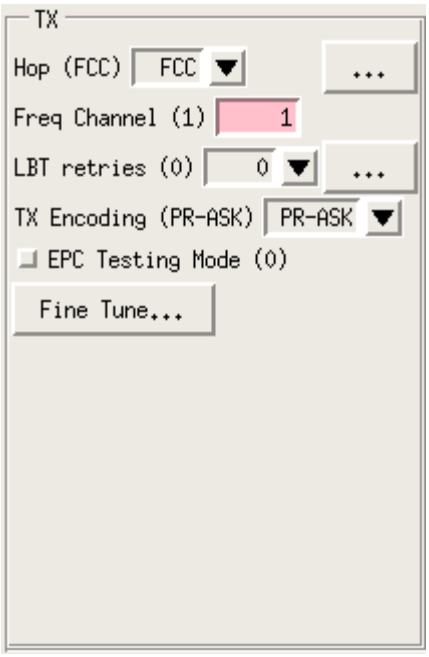


Figure 39: Transmit Parameters

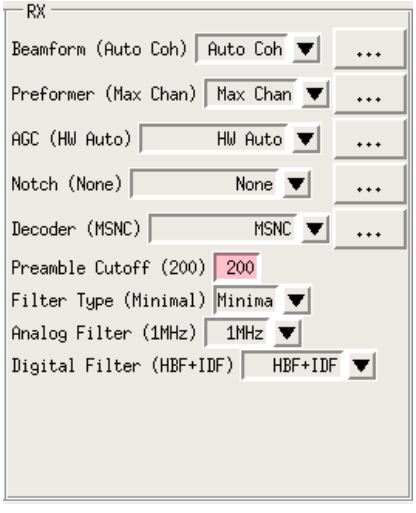


Figure 41: Receive Parameters

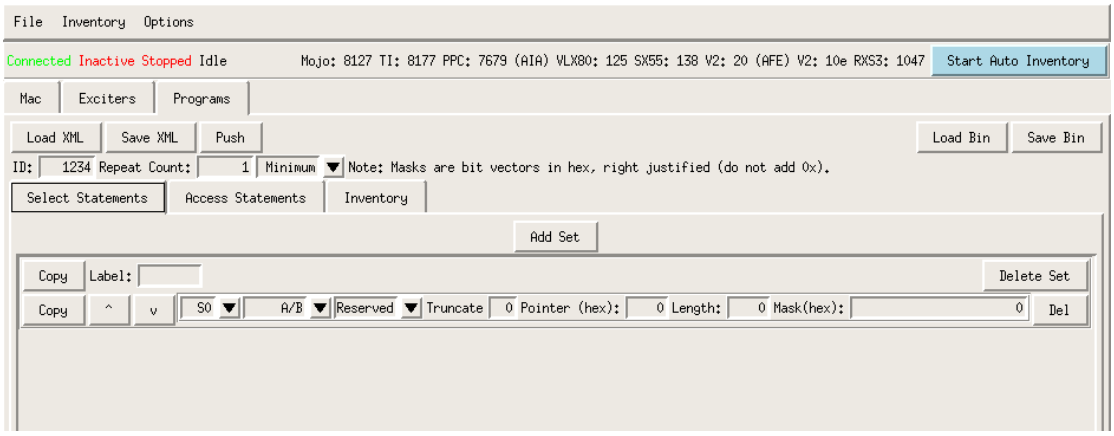


Figure 42: Select Statements

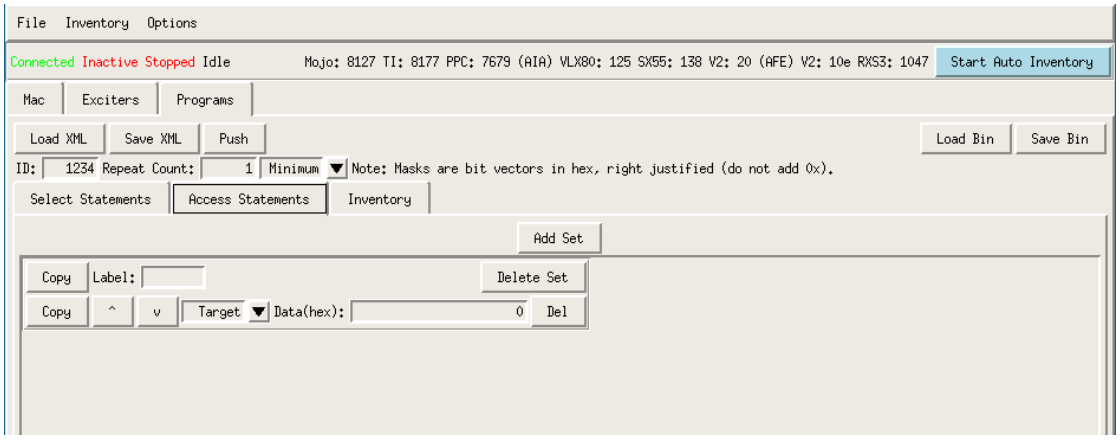


Figure 43: Access Statements

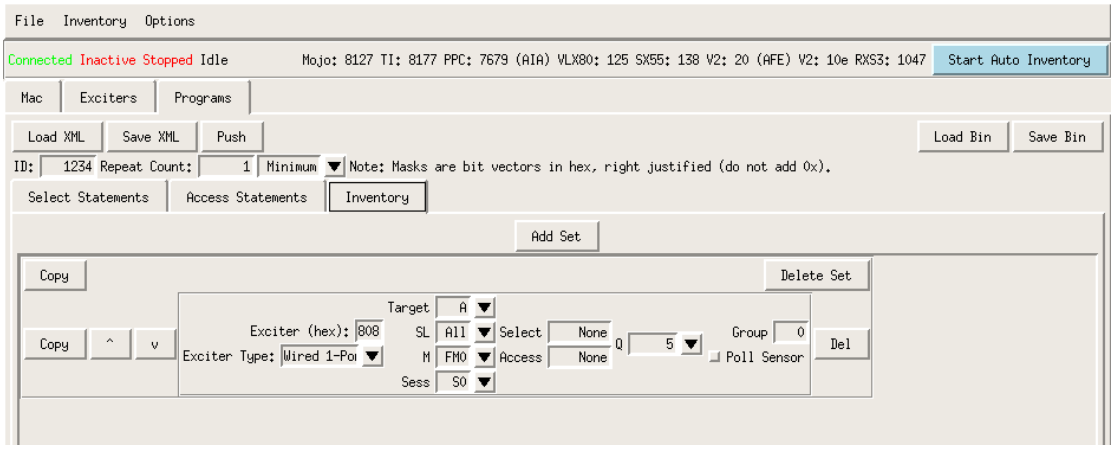


Figure 44: Inventory Programs

APPENDIX B: FCC NOTICE, STAR 3000 AND ENODE

CAUTION: To comply with FCC RF exposure compliance requirements, a separation distance of 20 cm must be maintained between the antenna of this device and all persons.

WARNING: This equipment has been tested and found to comply with the limits for Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction's manual, may cause interference to radio communications. Operation of this equipment in a residential area is likely to cause interference in which case the user will be required to correct the interference at his own expense. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

In order to ensure compliance with FCC regulations, shielded and grounded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

APPENDIX C: FCC NOTICE, EMUX

WARNING: This equipment has been tested and found to comply with the limits for Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction's manual, may cause interference to radio communications. Operation of this equipment in a residential area is likely to cause interference in which case the user will be required to correct the interference at his own expense. The user is cautioned that changes and modifications made to the equipment without approval of the manufacturer could void the user's authority to operate this equipment.

Mojix Incorporated

11075 Santa Monica Blvd., Suite 350

Los Angeles, CA 90025

Web:	www.mojix.com
Tel:	(877) 886-6549
E-mail:	service@mojix.com

Need More Help? Our product support team is comprised of individuals highly experienced in RFID deployments across a broad spectrum of application and use cases. If you are an existing customer of Mojix, please login to the secure area and submit a service request if you have additional questions. If you are unable to login, then please send us an email at: service@mojix.com.