

## Overview

The ESTeem Model 210 series of radios (Model 210C and 210M) are low throughput wireless Ethernet devices that provide an Ethernet link to remote devices over difficult terrain and long distances. To maximize the limited throughput (up to 64 Kbps) of these radios, ESTeem has implemented the Access Point Router (AP Router) Mode in the latest version of firmware (version 201905101333). This Router Mode will only pass Ethernet traffic for designated TCP/IP subnets that greatly reduces the wireless packets in the network. Being a router, the ESTeem 210 will not pass global packets or IP packets not specifically configured in the routing table.

This mode of operation is highly suggested for any Ethernet network that requires maximum Ethernet throughput of a Model 210 series wireless network. The ESTeem 210's are <u>not</u> shipped with this specialized firmware version because it is incompatible with all previous versions. This firmware version can be downloaded from our FTP site (<u>ftp://ftp.esteem.com/210M-M/RouterMode/</u>) or by contacting ESTeem support at (<u>support@esteem.com</u>) or 509-735-9092.

## **AP Router - Mode of Operation**

The Access Point (AP) Router mode of operation is used in fixed location systems where the Model 210 radios will not change their communication paths. This mode of operation is recommended for maximum wireless throughput because wireless beacons are not required.

## Configuration

## Ethernet Network Requirements

Controlling an Ethernet network to operate at low throughputs can be challenging. Using the Router mode in the Model 210 will greatly improve network performance but it does require some additional network planning. To operate as a Router, the ESTeem 210 <u>requires</u> that each remote location connected through the wireless network be on a unique TCP/IP subnet. This type of IP network configuration does not take any longer to configure but needs to be planned prior to addressing of the control network.

The attached Ethernet devices will need to have their Ethernet Gateway addresses adjusted to point at the connected ESTeem 210 radio. If there is already an Ethernet gateway on the Ethernet network, the routing information will need to be added to this device.

### Example Application

The following example site application will be used to explain the addressing requirements of Ethernet hardware with the Model 210 radio is used in Router Mode:



In the above example, the Master Terminal Unit (MTU) is gathering Ethernet information from (7) seven Remote Terminal Unit (RTU) using the ESTeem Model 210 series radios. RTU#3 is being used as a repeater for RTU#1, RTU#2 and RTU#4. In addition, RTU#4 is being used as a repeater for RTU#5, RTU#6 and RTU#7.

There are no mobile Ethernet devices in our example, so each of the above radios will be configured for AP Router mode. This network is isolated from the business network, so the routing information will be programmed into each ESTeem Model 210 in the network.

To continue the programming, each ESTeem Model 210 radio (we will use the ESTeem Model 210M for this example) will need to be identified by serial number and an TCP/IP addressing scheme selected. In this example a Class B addressing (172.16.XXX.XXX Mask 255.255.0.0) will be used.

The MTU, each of the remote RTU's and the wireless network will need to be on unique IP subnets as shown in Figure 2 below.



The following example (Figure 3) provides IP addressing detail for the first wireless link in the network from the MTU to RTU#3 being used as a repeater site:

МТИ	ESTeem 210M			ESTeem 210M	]	RTU#	3
S/N: 1	M-22578		S/N:	M-22581			
IP: 172.17.1.1 Ether Mask: 255.255.0.0 Eth M Gateway: 172.17.10.1 Wirel Wrlss Gatew	net IP: 172.1 lask: 255.2 ess IP: 172.1 Mask: 255.2 vay: 172.1	17.10.1 155.0.0 16.10.1 155.0.0 17.10.1	Ethe Eth Wire Wrls Gate	rnet IP: 17 Mask: 25 eless IP: 17 s Mask: 25 eway: 17	2.20.3.1 5.255.0.0 2.16.3.1 5.255.0.0 2.20.3.1	IP: 17: Mask: 25: Gateway: 17:	2.20.1.1 5.255.0.0 2.20.3.1
Static IP Routes			Static	IP Routes			
Network Add: 172.20.0.0 Netw	vork Add:	172.22.0.0	Netw	ork Add:	172.17.0.0	Network Add:	172.22.0.0
Netmask: 255.255.0.0 Netr	nask:	255.255.0.0	Netm	ask:	255.255.0.0	Netmask:	255.255.0.0
Gateway IP Add: 172.16.3.1 Gate	way IP Add:	172.16.3.1	Gatev	vay IP Add:	172.16.10.1	Gateway IP Add:	172.16.4.1
Network Add: 172.18.0.0 Netw	vork Add:	172.23.0.0	Netw	ork Add:	172.18.0.0	Network Add:	172.23.0.0
Netmask: 255.255.0.0 Netr	nask:	255.255.0.0	Netm	ask:	255.255.0.0	Netmask:	255.255.0.0
Gateway IP Add: 172.16.3.1 Gate	way IP Add:	172.16.3.1	Gatev	vay IP Add:	172.16.1.1	Gateway IP Add:	172.16.4.1
Network Add: 172.19.0.0 Netw	vork Add:	172.24.0.0	Netw	ork Add:	172.19.0.0	Network Add:	172.24.0.0
Netmask: 255.255.0.0 Netr	nask:	255.255.0.0	Netm	ask:	255.255.0.0	Netmask:	255.255.0.0
Gateway IP Add: 172.16.3.1 Gate	way IP Add:	172.16.3.1	Gatev	vay IP Add:	172.16.2.1	Gateway IP Add:	172.16.4.1
Network Add: 172.21.0.0 Use	Device: OFF		Netw	ork Add:	172.21.0.0	Use Device: OFF	
Netmask: 255.255.0.0			Netm	ask:	255.255.0.0		
Gateway IP Add: 172.16.3.1			Gatev	vay IP Add:	172.16.4.1		

#### Figure 3:IP Addressing Example

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### **Static Routing**

As shown in the above addressing example, each remote IP subnet will have a static route entry in the ESTeem 210 in AP Router mode. This routing table will allow the ESTeem 210 to send IP traffic to the correct destination and eliminate all Ethernet traffic not specifically for remote devices.

Another key configuration point is that the Static Routes beyond a repeater site only require entry of the "Upstream Gateway" IP address. For example, in the MTU configuration the Static Routes for all remote IP subnets point at Wireless IP address of RTU#3. RTU#3 is the Upstream Gateway for the MTU because all remote traffic passes through the repeater site.

In contrast, the Static Route configuration at RTU#3 has the routing information for the MTU, RTU#1, RTU#2 and RTU#4 (direct RF links from this site) but the sites past the RTU#4 repeater (RTU#5, RTU#6 & RTU#7) are programmed for the repeater's wireless IP address acting as the Upstream Gateway for those specific remote locations. This method of programming can be extended to all sites.

#### ESTeem Model 210 Programming Example – MTU

This programming example will show the internal web configuration of the Model 210M radio at the MTU site. This engineering report assumes the user is familiar with how to Discover the ESTeem 210 series radio and open the radio in a web browser. For questions on how to begin programming, please refer to the ESTeem Model 210 User's Manual.

1. From the Home screen in the Model 210 web Configuration Manager select the Setup tab and "AP Router" for mode of operation (Figure 4). Press the Next button to continue.

ESTeem: Configuration Manager	
Home         Setup         Wireless Status         Advanced         Backup         Restore         Log         CPU Status         Update         Reboot         About           Setup           This is the main Setup         Page. Select a mode of operation for the wireless d           Select Mode of Operation:           AP Router           Next	evice unit from the following list. Help

Figure 4:MTU Mode Selection

2. Enter the <u>Ethernet IP</u> address, Netmask and Default route (Gateway) IP for the MTU (Figure 5). The Default route should be the same as the Ethernet IP. Press the Next button.

ESTeem: Configuration		
Home Setup Wireless Status Advanced Backup Restore Log CPU State	us Update Reboot About	
Setup		
Enter values for the following fields for manua	IP setup of the ethernet device.	
n en angelen i degene den anne anne anne anne anne anne an		
Mode of operation:	AP Router	
Ethernet IP:	172.17.10.1	Help
Ethernet Netmask:	255.255.0.0	Help
Default route IP address:	172.17.10.1	Help
Previous	Next	Skip to Commit Page

#### Figure 5:Ethernet IP

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3. Enter the <u>Wireless IP</u> and Netmask of the AP Router (Figure 6). Press the Next button to continue.

ESTeem: Configuration	on Manager	
Home Setup Wireless Status Advanced Backup Restore Log CPU Stat	tus Update Reboot About	
Setup Enter values for the following fields for manua Mode of operation: Wireless IP address: Wireless Netmask: Previous	al IP setup of the <b>wireless</b> device. AP Router 172.16.10.1 255.255.0.0 Next	Help Help Skip to Commit Page

Figure 6:Wireless IP Entry

4. Select the RF Datarate and frequency of operation (Figure 7). These values must match in ALL Model 210 radios in the same wireless network. If there no line of sight (LOS) between antennas, the RF Datarate may need to be lowered to 43.2 Kbps or lower based on testing. Press Next.

ESTeem: Configuration Ma	anager	
Home Setup Wireless Status Advanced Backup Restore Log CPU Status Ur	odate Reboot About	
Setup		
Frequency and Datarate.		
Select Datarate:	Datarate Width QAM 9.6 Kbs 6.25 KHz 4 19.2 Kbs 6.25 KHz 16 28.9 KHz 16	
	<ul> <li>28.8 Kbs 6.25 KHz 64</li> <li>21.6 Kbs 12.5 KHz 4</li> <li>43.2 Kbs 12.5 KHz 16</li> <li>64.8 Kbs 12.5 KHz 64</li> </ul>	
Input frequency in Mhz:	161.500000	Help
Previous	Next	Skip to Commit Page

Figure 7:Datarate and Frequency

5. To maximize the Ethernet throughput set the Beacons to Disabled (Figure 8). Enter the SSID, select the Encryption type, and generate/enter the Encryption key. SSID, Encryption type, and Encryption key must match in all Model 210 radios in the same network. No Encryption in this example network so press the Next button.

## 210 Router Mode

# **Engineering Report**

ESTeem: Co	onfiguration Manager		
Home Setup Wireless Status Advanced Backup Restore Los	g CPU Status Update Reboot About		
Setup			
In the following fields, enter the set and select encryption for all peers	rvice set identifier (SSID 0-255) that will be common to the and clients.	wireless LAN device	
Beacons:	<ul><li>Enabled</li><li>Disabled</li></ul>		
	Recommended <b>Disabled</b> for networks consisting of <b>only</b> AP Mode radios, <b>Required</b> if Station mode radios are used in the network		
SSID(0-255):	0	Help	
Encryption type:	<ul> <li>None</li> <li>WEP 64-bit</li> <li>WEP 128-bit</li> <li>TKIP</li> <li>TKIP</li> <li>CCMP/AES-128</li> </ul>		
	Select the link encryption method. Note: the encryption method and key setting <u>must</u> be the same on <u>all</u> peers and clients.		
Key Generator:			
Link ID:			
Passphrase:			
Status:			
Generate Key	Default Key		
Encryption key:	11.22.33.44:55.66.77.88.99.00.aa bb.cc.dd.ee.ff Encryption key is not needed for this option. Encryption key must be the same on all peers and clients		
Previous	Next	Skip to Commit Page	

Figure 8:SSID & Encryption

6. Figure 9 shows the Access Control list where mobile Model 210 radios can be filtered by their MAC address. No mobile stations are in this example so leave at default and press Next button.

	ESTeem: Configuration Manager	
Home Setup Wireless Sta	ttus Advanced Backup Restore Log CPU Status Update Reboot About	
	Setup Enter the values in the fields below for configuring the Access Control List (ACL). T Authentication allowing or denying specific stations to the wireless network. If allow Security settings will be used and the entries will be ignored. NOTE: To deny all station access, select allow only those station MACs in the li addresses from the ACL. Choose one of the following MAC address authentication modes for the wireless device:	The ACL is a station MAC Address w_all is selected, the SSID & st below and remove all MAC Help
	deny only those station MACs in the list below MAC address: Access Control List:	Add MAC to Access Control List          Remove         Empty ACL         To remove a MAC address from the ACL, select the MAC to remove and click the Remove button. To remove all MAC addresses from the list, click the Empty ACL button.         Skip to Commit Page

#### Figure 9:Access Control List

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7. The Wireless peer configuration screen is where the direct radio communication paths are entered. Enter only the remote ESTeem 210 radios that have a direct RF link to the radio. The MTU has only a single RF link to the repeater (Figure 1). Press the Add button (Figure 11 below) on the screen to add a radio peer link and Figure 10 will be displayed. Enter the serial number of the RTU#3-Repeater radio, verify the Enable Link is set and press the Create Peer button.

ES Teem: Configuration Manager	
Home Setup Wireless Status Advanced Backup Restore Log CPU Status Update Reboot About	
Setup - Add a Wireless Peer	
To add a new <b>wireless</b> peer, enter the (compatible) radio's serial number or wireless lan (WLAN) MAC address pather cost, key type, the key and the rate set. Click the "Create Peer" button when complete.	ss, the
Serial Number or WLAN MAC address: 22581	
Enter the (compatible) radio serial number or WLAN MAC address cont colon separated hex bytes.	aining 6
Enable/disable link:   Enable  Disable  Enable/disable the peer link. Enable must be selected for the peers to communicate	
Return to Peer Setup Create Peer	

Figure 10:Peer Configuration

8. Verify the serial number for the RF peer is correct (Figure 11) and press the Next button.

ES	STeem: Co	onfigur	ation Manager			
Home Setup Wireless Status Advanced Backup I	Restore Log	CPU Sta	atus Update Reboot	About		
Setup						
Configure the following modes.	to enable w	vireless c	ommuncation betw	een other (co	ompatible) radios in Access Poi	nt (AP)
The wireless Peer links	created bel	low will b	oridge or route Ethe	rnet devices	connected to those (compatible	) radios.
You may add a <b>peer</b> to below.	the list, rem	nove an e	existing <b>peer</b> or mo	dify an existir	ng <b>peer</b> by clicking the appropri	ate button
	:	Serial#	MAC Addr	Enable		
	Peer List:	E-22581	00:04:3f:00:8f:16	true	Add	
					Remove	
					Modify	
				reasoned.	<b>v</b>	
			Previous N	ext	Skip to Co	mmit Page

Figure 11: Completed Peer Entry

9. Enter the name of the site being programmed in the Radio ID field. This Radio ID will be displayed in the Discovery utility, Home screen and wireless status for the site. AP Router uses both Static Routes and Static ARP Table that are in the Advanced menu. Press the "Go To Advanced Setup" button (Figure 12) to continue the programming.

# 210 Router Mode

ESTeem: Configuration Manager
ome Setup Wireless Status Advanced Backup Restore Log CPU Status Update Reboot About
Setup
To permanently commit your changes, click on the "Commit Changes" button below. Once the changes have been permanently saved, the system will reboot with the new settings in effect.
Radio ID: MTU Used as an additional identifier for this radio. E.g. "Room #301" , "Main Street #1".
Discovery Suite Configuration Tools: <ul> <li>Enable</li> <li>Disable</li> <li>Enable or Disable making configuration changes from the Discovery Suite Utility.</li> </ul>
Remote Assist Account:   Enable  Disable  Enable or Disable the Remote Assist Account.
Previous Commit Changes Go To Advanced Setup Cancel
Figure 12:Radio ID and Commit Pag

10. Move the radial to Static IP routes (Figure 13) and press the Next button.

	ESTeem: Configuration Manager	
Home Setup Wireless St	atus Advanced Backup Restore Log CPU Status Update Reboot About	
	Advanced	
	Modification of any setting in this section should only be completed if specifically noted in the documentation or requested by technical support. Adjustment of any variable in the advanced configuration may result in product inoperability.	
	The <b>Advanced</b> feature provides access to the configuration variables without the <u>Quick Setup</u> navigation using the <u>Setup</u> tab. This feature is intended for experienced users who know the interdependencies between the configuration variables.	
	To permanently commit all of your changes and reboot the system, click on the "Commit and Reboot" button below.	
	Global Settings: Global Variables	
	Iptables Setup O Ebtables Setup O	
	Set System Time O Wireless LAN Settings:	
	wland device Network Settings:	
	wland device	
	br1 device O TCP O	
	Static ARP Table O Static IP routes 🐵	
	Serial Port Settings: RS-232 O	
	Commit and Reboot Next	

Figure 13: Select Static IP Routes

11. A blank Static Route IP table (Figure 14) will be displayed. This Static Route table will instruct the Model 210 how to find all remote IP subnets and their connected Ethernet devices. Press the Add button to begin the static route entry.

ESTeem: Configuration Manager	
Home Setup Wireless Status Advanced Backup Restore Log CPU Status Update Reboot About	
Advanced - Static IP Routes The following list contains the static IP routes in the route table for the netwo network address, the netmask and the gateway IP address. To add a static IP route to the list, click the "Add" button. To remove a static I route in the list and click the "Remove" button. To modify a static IP route in t	rk. Each line in the list contains the P route from the list, select the static IP the list, select the static IP route in the list
and click the "Modify" button.  Network Address Netmask Gateway IP Use Device Device  Add Ren Mod	nove lify
* Return to Advanced	

Figure 14:Blank Static Route Page

12. Figure 15 will be displayed. Review the site layout diagram (Figure 2) and note that RTU#3's connected Ethernet devices will use a 172.20.xxx.xxx subnet. Enter the Network Destination address in the "Network address" field to cover all IP address in that subnet and then enter the Wireless IP address of the ESTeem 210 that will service that network (Figure 15) as the Gateway IP address. Press the "Create Static IP Route" button to create the route in the table.

ESTeem: Co	nfiguration Manager	
Home Setup Wireless Status Advanced Backup Restore Log	CPU Status Update Reboot About	
Advanced - Add a Static IP Ro To add a new static IP route, enter t "Create Static IP Route" button. Network address: Netmask: Gateway IP address: Use Device: Device:	Image: style         Image: style           172.20.0.0         172.20.0.0           255.255.0.0         172.16.3.1           Image: style         Image: style           Image: style         Image: style <th>Iress and click the</th>	Iress and click the
Create Static IP Route	Cancel	

Figure 15:Static Route Entry for RTU#3

13. Every remote IP subnet that the connected Ethernet devices will communicate with need to be added to the Static Route table (Figure 16). In our example, the MTU will gather information from all remote sites so an entry for each remote subnet is required. As discussed in the Static Routing instructions above, only the Upstream Gateway address (Wireless IP of the repeater) is required for sites beyond a repeater. Continue entering until all sites are entered (Figure 16). Press the Return to Advanced button to continue programming.

		ESTeem	: Configuration Manager	(a.	
Home Setup Wireles	s Status Advance	d Backup Restore	Log CPU Status Update Reboot About		
Adva	nced - Static II	P Routes			
The fo <b>netma</b> To add click th	llowing list contai sk and the gatev a static IP route e "Remove" butt Network Addr	ins the static IP rot way IP address. to the list, click the on. To modify a sta ress Netmask	a "Add" button. To remove a static IP route titic IP route in the list, select the static IP ro Gateway IP Use Device Device	h line in the list contains the <b>ne</b> from the list, select the static II oute in the list and click the "M	twork address, the P route in the list and odify" button.
Stati	c 172.20.0.0	255.255.0.0	172.16.3.1 false		Add .
I	P 172.18.0.0	255.255.0.0	172.16.3.1 false		Add
routes	: 172.19.0.0	255.255.0.0	172.16.3.1 false		Remove
	172.21.0.0	255.255.0.0	172.16.3.1 false		
	172.22.0.0	255.255.0.0	172.16.3.1 false		Modify
	172.23.0.0	255.255.0.0	172.16.3.1 false		
	172.24.0.0	255.255.0.0	172.16.3.1 false		-
	L			Return	to Advanced

Figure 16:Completed Static Routes for MTU

14. Move the radial to the Static ARP Table entry (Figure 17) and press the Next button.

	ESTeem: Configuration Manager
Home Setup Wirel	ess Status Advanced Backup Restore Log CPU Status Update Reboot About
	Advanced
	Modification of any setting in this section should only be completed if specifically noted in the documentation or requested by technical support. Adjustment of any variable in the advanced configuration may result in product inoperability.
	The <b>Advanced</b> feature provides access to the configuration variables without the <u>Quick Setup</u> navigation using the <u>Setup</u> tab. This feature is intended for experienced users who know the interdependencies between the configuration variables.
	To permanently commit all of your changes and reboot the system, click on the "Commit and Reboot" button below.
	Global Settings:
	Global Variables 💿
	Remote Access & Services 🔍
	Iptables Setup 🔘
	Ebtables Setup
	Set System Time 💿
	Wireless LAN Settings:
	włan0 device O
	Network Settings:
	eth0 device O
	whan 0 device $\odot$
	br0 device 🔍
	br1 device 🔍
	TCP 💿
	Static ARP Table 🔍
	Static IP routes 💿
	Serial Port Settings:
	RS-232 🔍
	Commit and Reboot Next

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Specifications subject to change without notice

15. A blank Static ARP table will be displayed (Figure 18). Completing the Static ARP table is <u>not</u> required for operation of a Model 210 AP Router network but is recommended for highest network throughput. This ARP table will eliminate the ARP requests between radios when moving Ethernet packets through the router network. Press the Add button to begin entry.

	ESTeem: Configuration Manager	
Home Setup Wireless St	atus Advanced Backup Restore Log CPU Status Update Reboot About	
	Advanced - Static ARPs	
	The following list contains the static ARPs in the ARP table for the network. Each line in the list contains the <b>network</b> address, and the <b>MAC Address</b> .	
	To add a static ARP to the list, click the "Add" button. To remove a static ARP from the list, select the static ARP in the list and click the "Remove" button. To modify a static ARP in the list, select the static ARP in the list and click the "Modify" button.	
	IP Address MAC Address	
	Static ARPs: Add Remove Modify	
	Return to Advanced	

Figure 18:Blank Static ARP Table

16. Enter only the direct RF links from any radio as a Static ARP entry. The MTU in our example only has a single RF link to the RTU#3 repeater. Enter the Wireless IP address for remote radio and the WLAN MAC address (Figure 19) and press the Add button to create the entry.

	ESTeem: Configuration Manager							
Home Setup Wireless St	atus Advanced Backup Restore Log CPU Status Update Reboot About							
	Advanced - Add a Static ARP To add a new static ARP, enter the ip address, and the MAC Address and click the "Add" button. Enter the IP address: 172.16.3.1 Enter the MAC: 00.04.3f xx xx xx Cancel Add							

Figure 19:Static ARP Table Entry

17. Press the "Return to Advanced" button and then the "Commit and Reboot" button (Figure 17) to complete the programming of the MTU's Model 210M radio.

# ESTeem Model 210 Programming Example – RTU#3(Repeater)

This programming example is for the Model 210M at RTU#3 repeater site. All radios in wireless network will be programmed similar to the MTU or the RTU3# repeater. Almost every configuration page for the 210M in RTU#3 is the same as shown above in the MTU configuration example. Only the pages with any programming changes will be shown below:

## Setting the Ethernet IP address

Enter the IP address, netmask and Default route IP (Gateway) of RTU#3.



Figure 20: Set IP Address of Ethernet Interface

### Setting the Wireless IP address

Enter the IP address and netmask of the wireless interface of RTU#3.

	ESTeem: Configuration	on Manager		
Home Setup Wireless Sta	atus Advanced Backup Restore Log CPU Status	Update Reboot About		
	Setup			
	Enter values for the following fields for manual	IP setup of the wireless device.		
	Mode of operation:	AP Router		
	Wireless IP address:	172.16.3.1	Help	
	Wireless Netmask:	255.255.0.0	Help	
	Previous	Next	Skip to Commit Page	

Figure 21:Configure the Wireless IP Address

### Wireless Peer Configuration

Unlike the MTU, the RTU#3 radio has four (4) direct RF links. Each of these RF links will be a unique entry in the Peer table (Figure 22).

	ESTeem: Co	onfigura	ation Manager		
Home Setup Wireless Status Advanced Bac	kup <u>Restore</u> Log	CPU Sta	ttus Update Reboot	About	
Setup Configure the follo modes. The wireless Peer You may add a <b>pe</b> below.	wing to enable wi links created belo <b>er</b> to the list, remo	ireless c ow will b ove an e	ommuncation between ridge or route Ether existing <b>peer</b> or models	een other (c net devices ify an existi	(compatible) radios in Access Point (AP) es connected to those (compatible) radios. sting <b>peer</b> by clicking the appropriate button
	Seer List:	Gerial# E-22578 E-22579 E-22580 E-22582	MAC Addr 00:04:3f:00:8f:0a 00:04:3f:00:8f:0e 00:04:3f:00:8f:12 00:04:3f:00:8f:1a	inable true true true true	Add Remove Modify

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Figure 22:RTU#3 Peer Entry

### Static Routing Table

RTU#3 has a direct connection to the MTU, RTU#1, RTU#2 and RTU#4 (second repeater). Note in Figure 23 that each of these direct location's Ethernet IP subnets are routed to the <u>Wireless IP</u> address for each radio. Just like in the configuration of the MTU, all sites through a repeater (RTU#5, RTU#6 & RTU#7) are configured for the repeater's Wireless IP address (Upstream Gateway address).

-		ed Backup Restore	Log CPU Status Update Reboot About	
Advan	ced - Static I	P Routes		
The follo	owing list conta <b>k</b> and the <b>gate</b> r a static IP route	ains the static IP rop way IP address. The to the list, click the	ites in the route table for the network. Each line in the	Ist contains the <b>network address</b> , the st, select the static IP route in the list and
click the	"Remove" but	ton. To modify a st	atic IP route in the list, select the static IP route in the	list and click the "Modify" button.
click the	Network Add	ress Netmask	Gateway IP Use Device Device	list and click the "Modify" button.
Static	Network Adds	ton. To modify a sta ress Netmask 255.255.0.0 255.255.0.0	Gateway IP Use Device Device 172.16.10.1 false	iist and click the "Modify" button.
Static IP	Network Adda 172.17.0.0 172.18.0.0 172.19.0.0	ton. To modify a sta ress Netmask 255.255.0.0 255.255.0.0 255.255.0.0	atic IP route in the list, select the static IP route in the Gateway IP Use Device Device 172.16.10.1 false 172.16.2.1 false 172.16.2.1 false	list and click the "Modify" button.
Static IP routes:	Network Adda 172.17.0.0 172.19.0.0 172.19.0.0	ton. To modify a st ress Netmask 255.255.0.0 255.255.0.0 255.255.0.0 255.255.0.0	Gateway IP Use Device Device 172.16.10.1 false 172.16.2.1 false 172.16.2.1 false 172.16.2.1 false 172.16.2.1 false	list and click the "Modify" button.
Static IP routes:	Network Adda 172.17.0.0 172.19.0.0 172.21.0.0 172.22.0.0	ton. To modify a sta ress Netmask 255,255,0,0 255,255,0,0 255,255,0,0 255,255,0,0 255,255,0,0	Gateway IP Use Device Device 172.16.10.1 false 172.16.2.1 false 172.16.4.1 false 172.16.4.1 false 172.16.4.1 false	list and click the "Modify" button.
Static IP routes:	Network Adda 172.17.0.0 172.18.0.0 172.21.0.0 172.22.0.0 172.22.0.0	ton. To modify a sta ress Netmask 255.255.0.0 255.255.0.0 255.255.0.0 255.255.0.0 255.255.0.0 255.255.0.0	Gateway IP Use Device Device 172.16.10.1 false 172.16.1.1 false 172.16.2.1 false 172.16.4.1 false 172.16.4.1 false 172.16.4.1 false 172.16.4.1 false	list and click the "Modify" button.



### Static ARP Table

Configure the Static ARP table with all direct RF links from RTU#3. The WLAN MAC address for each radio can be found generated in the Peer Configuration (Figure 22), listed on the radio's QA sheet or on the product label on the bottom of the Model 210 radio.

ESTeem	: Configuration	Manager	Ga.	ESTEEM INDUSTRIAL WIRELESS SOLUTIONS
Home Setup Wireless Status Advanced Backup Restore	Log CPU Status L	Jpdate Reboot About		
Advanced - Static ARPs				
The following list contains the s address, and the MAC Addres	tatic ARPs in the /	ARP table for the network.	Each line in the list contains	the <b>network</b>
To add a static ARP to the list, list and click the "Remove" butt "Modify" button.	click the "Add" but on. To modify a st	ton. To remove a static AR atic ARP in the list, select t	P from the list, select the stat he static ARP in the list and o	ic ARP in the lick the
	IP Address	MAC Address		
Static ARPs:	172.16.10.1	00:04:3f:00:8f:0a *	Add	
	172.16.2.1	00:04:3f:00:8f:12	Remove	
	172.16.4.1	00:04:3f:00:8f:1a	Modify	
		Return to Advanced		

Figure 24: Static ARP Table for RTUI#3

## **Troubleshooting and Testing**

Once all radios are configured correctly in the AP Router mode, all connected Ethernet devices can share Ethernet data. The following are a few troubleshooting notes to consider when testing or programming for the Model 210 AP Router network.

• Any Ethernet device connected to the Model 210 radio will need to be in the same IP subnet as the Ethernet IP configuration. The Ethernet device will also need to set its Gateway address to the Ethernet IP of the Model 210 radio. For example, a computer connected to the MTU (direct to the radio or through a switch) will need to have the IP subnet set to 172.17.xxx.xxx and the Gateway address to 172.17.10.1 (Figure 25).

eneral	
You can get IP settings assigne this capability. Otherwise, you for the appropriate IP settings	ed automatically if your network supports need to ask your network administrator
Obtain an IP address aut	omatically
• Use the following IP addre	ess:
IP address:	172 . 17 . 10 . 100
Subnet mask:	255.255.0.0
Default gateway:	172 . 17 . 10 . 1
Obtain DNS server addres	ss automatically
O Use the following DNS ser	rver addresses:
Preferred DNS server:	
Alternate DNS server:	6 (B) 14
🔲 Validate settings upon ex	xit Advanced

Figure 25:Ethernet Device MTU Settings

- If the computer (or any Ethernet device) is configured for a connection to the MTU (above) is moved to a remote location, the IP address and Gateway address will need to be adjusted. For example, if the computer is moved and connected to RTU#6's radio, the IP address will need to be changed to 172.23.6.100 and the Default gateway set to 172.23.6.1.
- With beacons disabled, the Status LED on the front panel will always be ON. Unlike other modes of operation, the Status LED will not go ON when connected and OFF when disconnected.
- When testing the communication links and routing to the remote radios and their devices, Ping the connected ESTeem 210's Ethernet IP address. You will also be able to Ping the remote radios' Ethernet IP addresses and connected devices but you will <u>NOT</u> be able to Ping the remote Wireless IP address.