MGH WIRELESS MAC 5500 ECG CART WITH BARCODE SCANNER – CONFIGURATION GUIDE

Document Rev 1.0

OVERVIEW: WIRELESS ECG AND BARCODE SCANNER ON MAC 5500

Date	Editor	Document Rev	Changed Added
Aug 15, 2016	Chaim Katz (Revised by Ketaki Muthal)	1.0	Initial Creation

Contents:

1. Introduction

Wireless ECG Machine with Barcode Scanner is a solution to increase efficiency in ECG processing by the ECG Lab. With user of Barcode scanners, clinical users will be able to scan the Patient MRN from either Patient's wrist band or from the ECG Orders page handed to the patients in the Outpatient setting. With wireless ECG carts, retrieval of Order number and Patient ADT from MUSE and transmission of ECG back to MUSE will become efficient. Clinical users need not wait for the end of the day to transmit to MUSE, they can transmit an ECG with appropriate Order number and demographics right after it is acquired.

For a MAC5500 ECG machine to become wireless and have a barcode scanner, the following system components are needed:

a. A physical Silex Bridge and a corresponding option code on the MAC cart for WIRELESS option to be enabled.
b. A physical Barcode Scanner and a corresponding option code on the MAC cart for BARCODE SCANNING to be enabled.
c. A Wireless certificate from Network Security, Partners IS to load on the Silex Bridge such that the bridge connects to desired wireless SSID. In this case, phswifi10.
d. A DHCP IP Reservation (virtually Static IP) and subnet mask of the area where the ECG cart will be deployed from Network Engineering, Partners IS and an approved Firewall Exception for this IP from Network Security, Partners IS for communication with MUSE.
e. A Partners PC (with ability to change its IP address) for configurations of the Silex Bridge.
f. A cross over cable (pink) to be able to connect to a Partners Computer for configuration.
g. MUSE version 8.0 for two way communication with the ECG cart.

Further, the MAC5500 ECG Cart and MUSE Modem need separate configuration to incorporate barcode scanning and wireless transmission.

2. Configuration of the ECG Machine:

a. There are several configurations on the EKG cart, however only a few to allow the cart to communicate wirelessly.
b. Enter system setup on the EKG cart
c. Go to miscellaneous setup
- Verify the cart has "Serial Power Always On" set to Yes

d. Go to transmission setup
- Set the "Serial Line Baud Rate" = 115.2K
- Set the "Default Location" = Serial Line (MUSE)

e. Configure remaining components of the EKG cart per the hospital default/site specific settings as needed.
- **Note:** Some defaults may change for specific locations such as the EKG Lab or some clinics. Barcode reader settings are different for inpatient which use the patient wristband linear barcode and outpatient clinics which may use specialized encounter forms with 2D barcodes. See Barcode configuration section of this document.

Created By: CNK (Aug 2016)
Revised By: KSM (Aug 2016)
Reference: BWH Wireless EKG Cart Configuration Document (By: Kevin Kreitzman; July 2013)

3. Configuration of Silex Bridge

a. MAC Address of the Silex Bridge:

Record the MAC address of the Silex Bridge. It is located at the back of the bridge. Please see Figure 1 which shows the MAC address highlighted on the Silex Bridge.

Figure 1: Silex Bridge with its MAC Address highlighted.

b. Securing certificate from Network Security:

For configuration of the Silex Bridge, 2 types of Certificates are used:

- Intermediate or Public Certificate (Full chain) – This certificate can be same for all Silex Bridge. Sometimes Network Security combines this certificate with private Certificate. For the purposes of configuring for ECG Machines, it should be explicitly mentioned that the full chain cert be independent of the Private cert or no chain cert. All current and future Intermediate/ Public Certs should be located here –

  \\Sfa1\sfa\DBEMAIN\Resource Book\MGH\MGH MUSE\Wireless ECG Certificates\Intermediate Cert or Full Chain

- Private Certificate (No chain) – These certs are MAC address specific. They should be provided independent of the Full chain. All current and future Private Certs should be located here –

  \\Sfa1\sfa\DBEMAIN\Resource Book\MGH\MGH MUSE\Wireless ECG Certificates\Private Cert or No chain

c. Configuration:

- **Configure Laptop Network Settings:**
  - Go to my computer and type ncpa.cpl and right click on local area connection and select properties.
  - Scroll down and select “Internet Protocol (TCP/IP)” and then click properties

- Select "use the following IP address". Set the IP address to 192.168.1.100 and the subnet mask to 255.255.255.0. Click ok. This is to put the computer on the same network as the Silex Bridge (default IP of the Silex is 192.168.1.3)

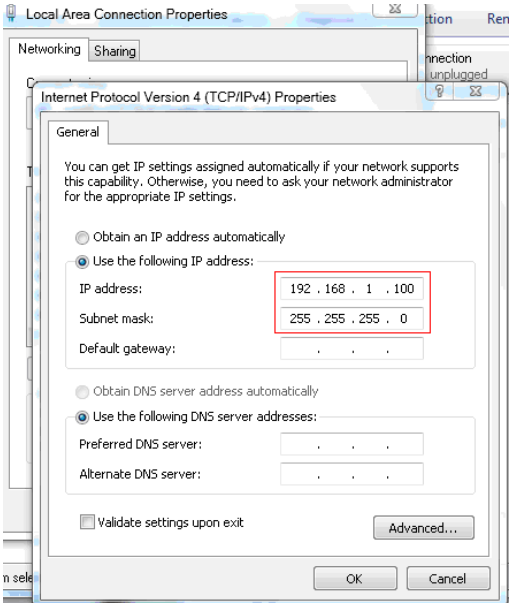

Figure 2: Set IP on the Computer to be on the same network as Silex Bridge.

- **Configure the Wireless Bridge**

  - Connect the PC to the wireless bridge using a crossover cable.
  - Make sure the wireless bridge is connected to your ECG cart on COM2.
  - The Cart should be switched ON and power light on the bridge is ON.
  - If the power light does not come on the wireless bridge verify the cart settings are set correctly to power on the PS2 connection when the cart is turned on. To do so, go to –
    Misc Setupc--> Serial Power --> always ON = Yes.
  - Open command prompt--> windows command and ping 192.168.1.3, the bridge and you should see transmission of data.
  - If it does not ping, wait for 2-3 minutes and retry.
  - If it still does not ping, reset Silex by pressing reset button and holding for five seconds.
  - Wait for 5 minutes and retry ping.
  - Open a web browser from the laptop and type the IP address of the bridge - 192.168.1.3. The page below should display.
  - If it does not, try IP address 192.168.1.1.
  - If you still do not see the page try to ping either of the address mentioned, verify the laptop IP settings from the previous step, and troubleshoot your network cable.

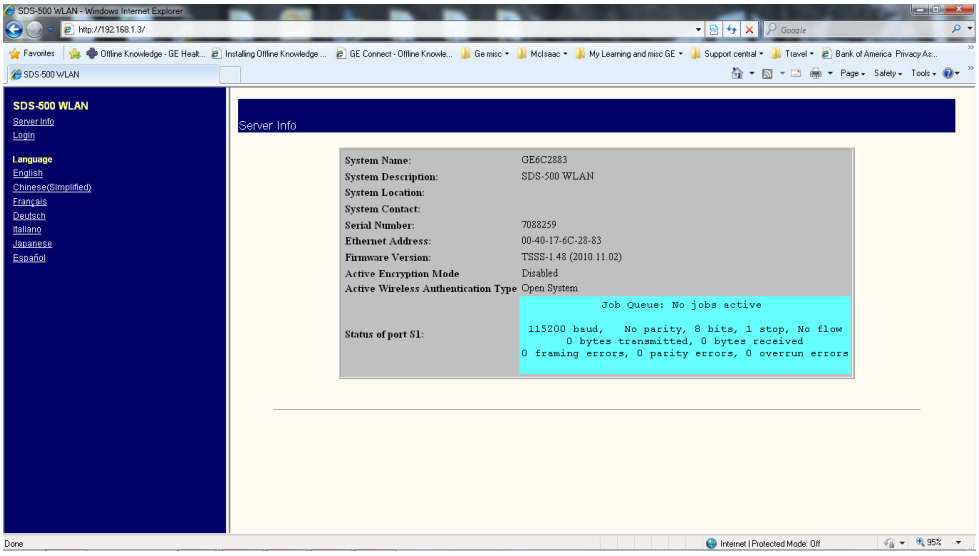

Figure 3:Webpage to Configure the Silex Bridge

- Select login from the left hand panel. The log in password is access
- From the left pan select I/O Services
- Select GExxxxxx_S1_B where xxxxxx are last 6 characters of the MAC ID.
- On the screen below specify the Raw TCP Port that will be used by the cart to communicate with the MUSE and hit submit.
- Note: This is cart dependant; work with your CE/MUSE system administrator to determine the correct port settings for this device. Each cart will have its own entry, starting from 3001 for the first cart, 3002 for the second and so on.
- Note: The Protocols setting should default to TCP/IP but this should be verified

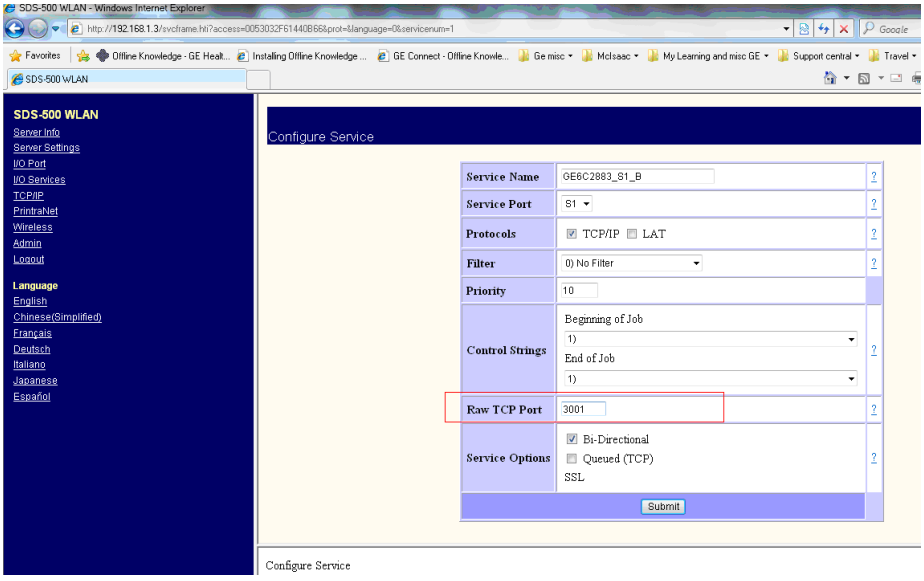

Figure 4:Webpage to Configure the Silex Bridge

- Select TCP/IP from the pane on the left
- Change the IP Address, Subnet Mask, and Gateway for the device to that reserved by the IP address for that device. (IP Address provided by Network Engineering)
- Set the "Boot Method" to static
- Note: For EKG lab/loaner carts the IP, Subnet Mask, and Gateway should be set according to any one of the reservations for the cart. The boot method in the case of those carts needs to be set to DHCP.
- Click Submit

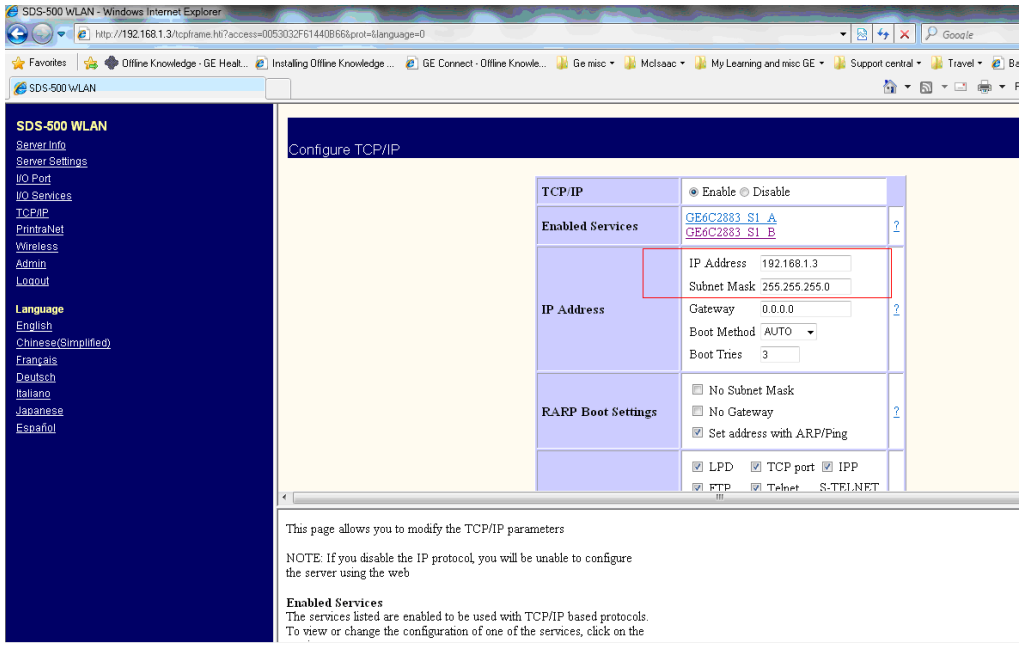

Figure 5:Webpage to Configure the Silex Bridge

- Select wireless from the pane on the left and set the SSID to phswifi10. Click submit
- Select "Configure Network Security"
- Select configure private key
- Click browse and navigate to/select the .pem file certificate created for the MAC address of the wireless bridge. Click submit
- Select wireless from the pane on the left
- Select "Configure Network Security"
- Select "Configure Authentication Server Certificate"
- Click browse and navigate to/select the .pem file created for the intermediate certificate authority or the issuing certificate authority.
- Select wireless from the pane on the left
- Select "Configure Network Security"
- Set encryption mode to WPA2
- Set wireless authentication type to TLS
- Set USER ID to <MAC_address>@phsmed.partners.org
- Where MAC_address is the MAC address of the wireless bridge in the form XX-XX-XX-XX-XX-XX

- Set the password for the user id to 1234
- Click submit

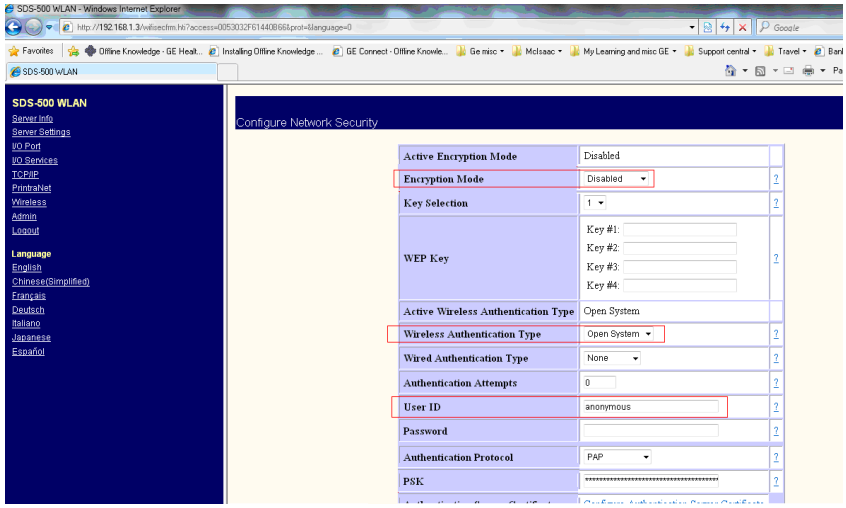

Figure 6:Webpage to Configure the Silex Bridge

- On the bottom of the browser click on "Configuration has been modified. The unit must be reset for new values to take effect".
- Disconnect the crossover cable from the EKG cart. Take the EKG cart to the appropriate area of service, turn it on, and try to ping it from a partners PC to make sure it is getting on the network.
- If you are unable to ping troubleshoot wireless bridge configuration

4. MUSE Application Configuration

a. Login to the MUSE via local application or Citrix

b. Select system →setup

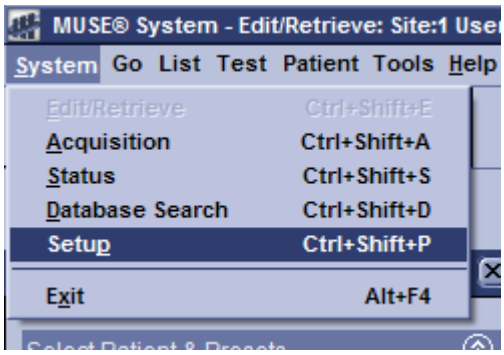

Figure 7: MUSE Configuration Window on Application / Database Server

c. Select "Modems" from the panel on the left

d. Right click in the list of modems and select New → CSI Network

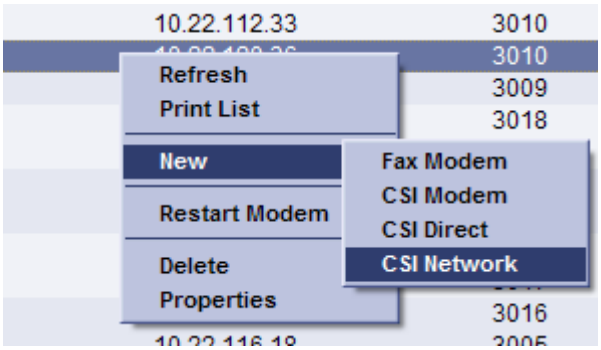

Figure 8: MUSE Configuration Window on Application / Database Server

e. Select computer name and enter PHSQLMUSE10 (Communication server)

f. Select IP address or Hostname and enter the IP address of the EKG cart from the Silex wireless bridge configuration

g. Select Port and enter the Raw TCP Port number from the Silex wireless bridge configuration

h. Click Ok

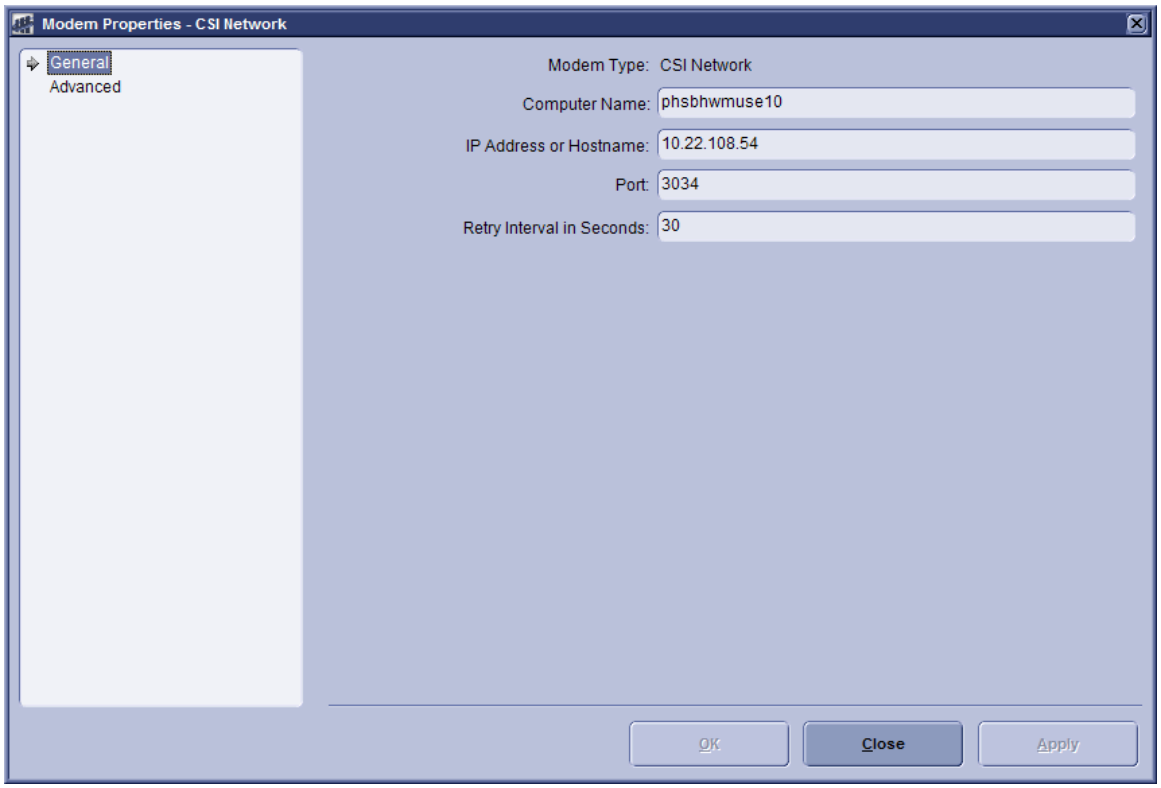

Figure 8: MUSE Configuration Window on Application / Database Server

i. Right click on the modem you just added in the modem list and select "Restart Modem"

j. Perform a test transmission from the EKG cart in the appropriate area and verify you are able to transmit into the MUSE.

k. NOTE: If this is the first time you are doing this, contact GE to set a certain property to enable order retrieval

5. Barcode Scanner Configuration

a. Manual Configuration

- After configuring the wireless configuration as seen above turn on the Machine and go to -
- System Setup > Basic System > Input Method Select > Patient Data Input Device > Bar Code Reader > Return. The *Manual Bar Code Reader Configuration* window opens.
- Before we proceed, information on the following terminology is important to understand.
- ***"Offset"*** = Field's beginning position, where first field on barcode offset will be 0. For the subsequent fields, the offset is typically the sum of the previous field's offset and length. However, this is not always the case; there may be cases where fields may have gaps between them.
- ***"Length"*** = Total number of bytes for this field.
- ***"Inpatient Barcode"=*** the one highlighted in red box is the 2D barcode and the one highlighted in yellow box is 1D barcode.
- The 2D barcode comprises of Visit number, a line separator "|" followed by the MRN. Eg: 3116809485|3086732
- The 1D barcode comprises of Visit number alone preceding with "AC". Eg: AC3116809485
- For the purposes of wireless ECG and barcode scanning, we need the MRN # and hence we should always scan the 2D code for the inpatient barcode.

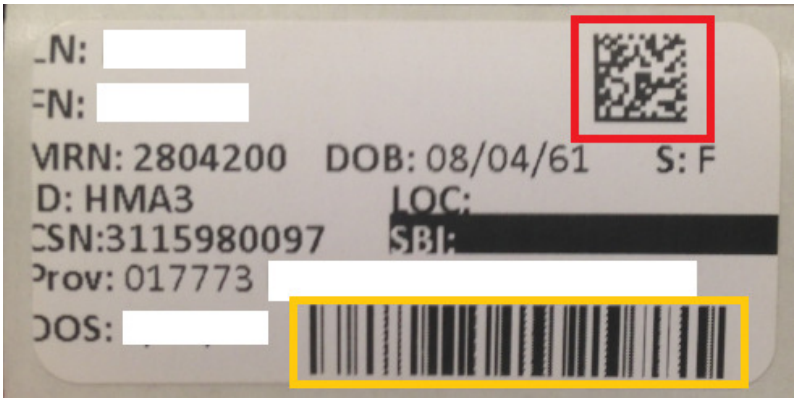

Figure 9: Inpatient Barcode

- ***"Outpatient Barcode"=*** The one highlighted in red box is the 1D barcode for the MRN, Eg: 5832659 and the one highlighted in yellow box is the 1D barcode for the Visit Number, Eg: 3116771864.
- For the purposes of wireless ECG and barcode scanning, we need MRN # and hence we should always scan the 1D MRN code on the left side of the page.

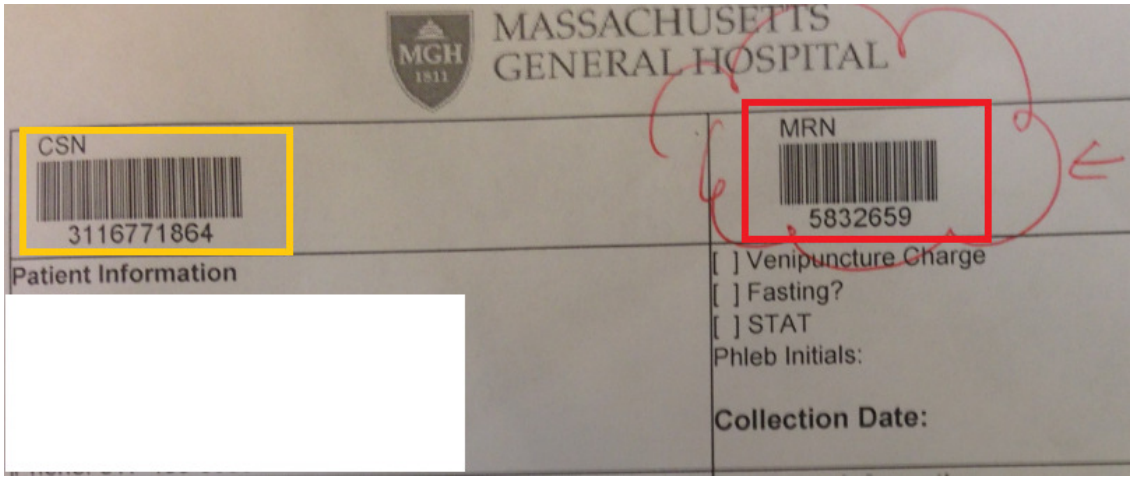

Figure 10: Outpatient Barcode

- When under Manual Barcode Configuration on the MAC 5500 cart, fill appropriate information for cart located in inpatient areas vs. outpatient areas. This setting is part of defaults and hence it is very important to copy defaults in case you are switching the machines. Not doing so will cause scanning of a wrong barcode and thereby a wrong MRN will populate in a wrong filed.
- Please see the table below to see what settings should be entered in case you have to set the barcode defaults. 2 ECG carts in the Inpatient Team and 2 carts in the Ambulatory Team area are predetermined to be loaners for Wireless ECG Machines.

Field	Byte Length	In Patient (Sticker)	Out Patient (Sheet)
Total number of bytes	Enter the total number of bytes contained in the patient bar code. This is typically, but not necessarily, the sum of the bytes listed in the following fields.	18	7
Patient MRN	The patient's identification number. Enter the field's ***Offset*** and ***Length***. Be aware of the following criteria when setting the length: • can be from 0 to 16 • should equal the ID length set up on the ***Patient Question*** window • should equal the patient ID length for the MUSE CV system with which the MAC system communicates.	11 offset 9 length	0 offset 9 length
Visit	The visit's identification number. Enter the field's ***Offset*** and ***Length***. Be aware of the following criteria when setting the length: • value can be from 0 to 19	0 offset 10 length	DO NOT USE

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	• should equal the visit length from the ADT system		
First name	Not On Barcode	NA	NA
Last Name	Not On Barcode	NA	NA
Year of birth	Not On Barcode	NA	NA
Month of birth	Not On Barcode	NA	NA
Day of birth	Not On Barcode	NA	NA
Gender	Not On Barcode	NA	NA
Enable data retrieval	Determines whether the system will issue a query for matching orders or patient information when scanning the bard code. To enable data retrieval, select ***Yes***.	YES	YES

Figure 11: Manual Barcode Configuration Table.

Card Reader Value to Use	Criteria used to query for additional information. Options are • ***Patient ID*** -uses the patient's ID number to retrieve order or ADT information. • ***Visit-*** uses the visit number to retrieve order or ADT information.	Patient ID	Patient ID
Data to Retrieve	Selects the information retrieved. Options are: • ***Orders*** This option retrieves orders from the MUSE system or cart, depending on the setting of the ***Retrieve Orders From*** field. • ***Orders then ADT if no orders*** This option first attempts to retrieve matching orders. If no orders are found, it then attempts to retrieve patient demographics. • ***ADT (Patient Demographics)*** This option retrieves patient demographics from the associated ADT system.	Orders then ADT if no orders	Orders then ADT if no orders
Retrieve Orders From	Select the source from which to retrieve order information. Options are: • ***MUSE only*** This option retrieves orders from the associated MUSE CV system. • ***CART only*** This option retrieves orders that have already been downloaded to the cart. • ***Cart then MUSE***	MUSE Only	MUSE only

	This option retrieves orders that have already been downloaded to the cart. If it cannot find matching orders on the cart, it attempts to download them from the associated MUSE CV system.		

Figure 12: Table elaborating information used to conduct query, what information is retrieved, and where the information is retrieved from..

- Once you have setup the Cart to read appropriate Barcode, select save Setup to System and exit.

b. Test Scanning Barcode

- Bar code scanner should be connected to port A on the back panel of the system.
- Muse Cable should be connected to COM 2

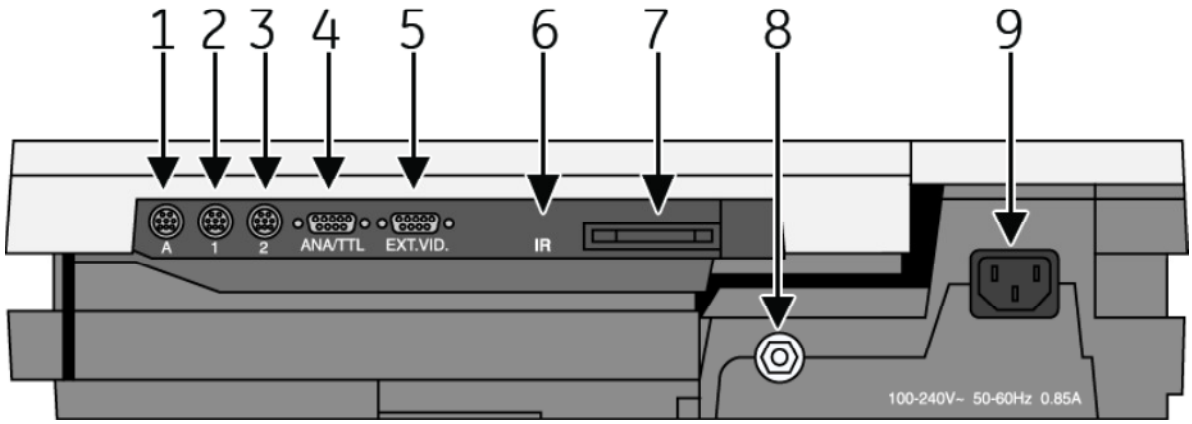

Figure 13: Port description of all ports at the back of MAC 5500

- For any new Patient, hit "Patient Data" button on the ECG cart. The message ***Scan the bar code*** opens.
- Scan the bar code.

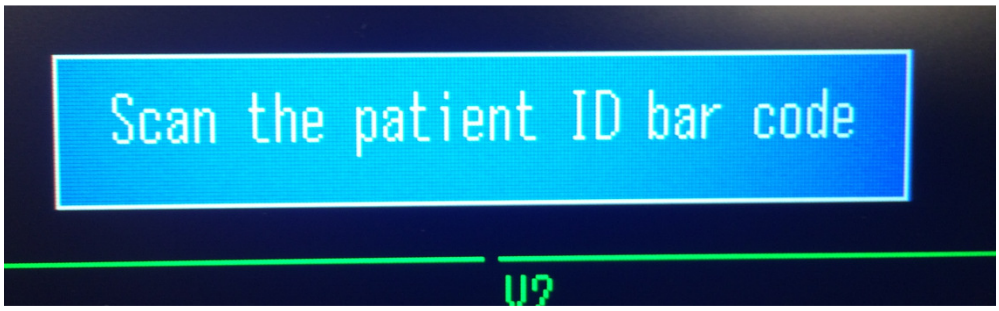

Figure 14: Screen shots of the ECG MAC cart for Barcode Scanning

- Currently Scan 2D test patient barcode as highlighted in red below:

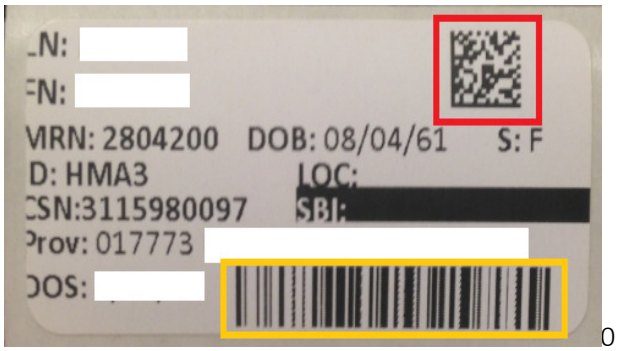

Figure 15: Sample 2D Barcode for Inpatient Setting

- This scan will produce five possible options where you can accept and modify as needed:
  a. No Matching Records the system loads the patient information from the bar code and displays it in the Patient Data window. (Patient ID and Visit number from 2D and patient ID from 1D)
  b. Only one ADT Record loads that record and displays it in the Patient Data window.
  c. Multiple matching ADT records, Displays a list of those records. Do one of the following:
     i. Select the correct record to load its ADT information.
     ii. Select Cancel to load the patient information directly from the bar code.
  d. One matching order, it retrieves that order and can modify the order information or begin the test
  e. Multiple matching orders, it displays a list of those orders.
     Do one of the following:
     i. Select the correct order to load it.
     ii. Select Cancel to load the patient information directly from the bar code.

Successful configuration of all system components will ensure problem free functioning of the wireless ECG machine with the barcode scanner.
For any questions regarding this document, contact Ketaki Muthal in Department of Biomedical Engineering.