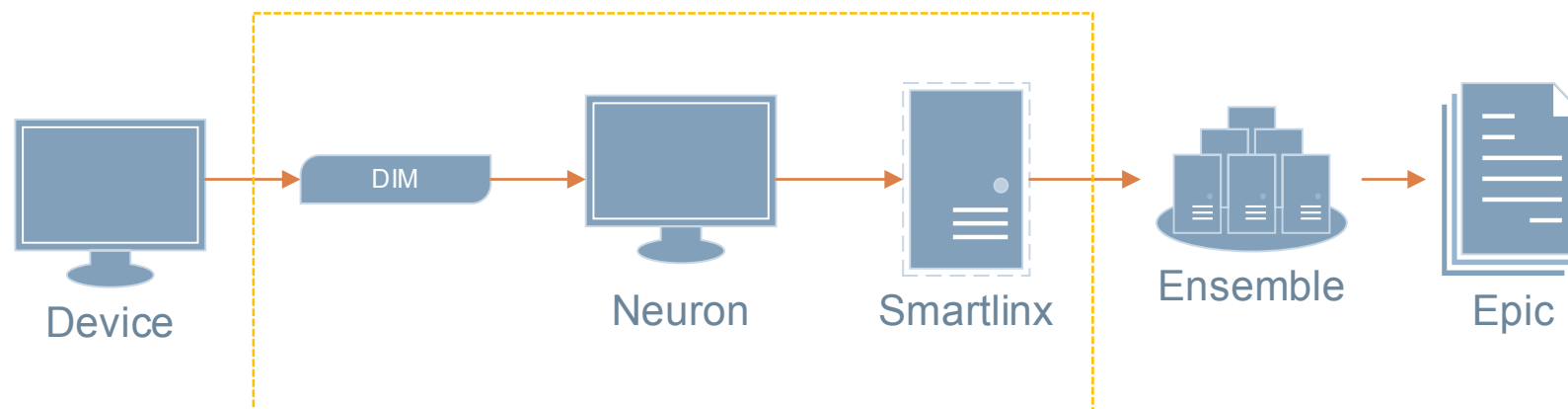


Epic BMDI with Capsule

Agenda

1. Basic Troubleshooting
 1. Connectivity overview
 1. DIM
 2. Neuron / Axon
 3. Smartlinx
 4. Ensemble
 5. Epic
 2. Common troubleshooting
2. Advanced
 1. MPI ID conventions
 2. Neuron data view
 3. Smartlinx
 1. DMM Stacks
 2. Output connectors
 3. Loopback

Data flow to Epic in Capsule



**** New components ****

Device Identification Module (DIM)

- DIM connects the medical device to Capsule's communication device on the network (Neuron or Axon)
- DIM is programmed with:
 - Medical Device Type
 - Free-Text label for identifying the device called "ID Tag"
 - Baud Rate
 - Parity / Data / Stop



Neurons

- Connects to Smartlinx server via PHS IS wired and wireless networks
- Configuration contains drivers needed for device data
- Typically configured for specific OR, Bed or location
- Displays connected devices and current data transmission
- Inputs:
 - Medical device data from DIMs
 - ADT info for current patient, if applicable
- Outputs
 - Medical device data to Smartlinx



Device to Neuron Connectivity



Device

Serial Cable

Connects to
medical
device

DIM

Identifies
device
connected

Patch Cable

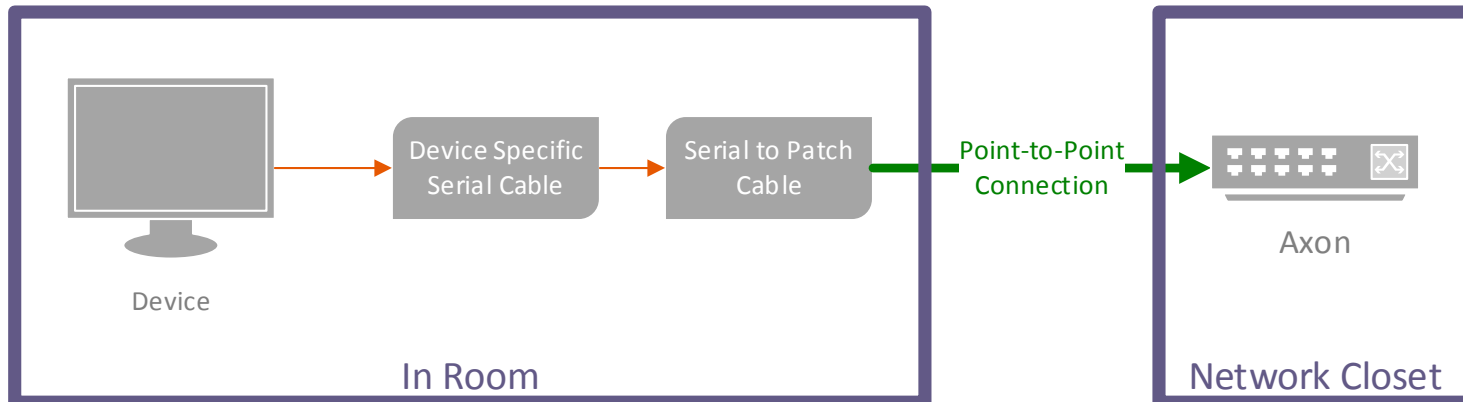
Connects
DIM to
Neuron

Neuron

Manages
device
connectivity
at the bedside,
sends data to
server

Axons (CPC, Endo, Waltham/Danvers PACUs)

- 8-Port, 4-Port, & 1-Port Configurations
- Wired connection
- Each port is programmed to a specific room & device type



Smartlinx

- Connects to Ensemble for Epic integration
- Interface / Application server configured in clusters of 3 servers
- Runs two applications:
 - Smartlinx Command Console – data and output management
 - Capsule Command Console (C3) – Neuron management
- Inputs:
 - Raw medical device data
- Outputs:
 - Filtered and transformed device data as HL7 messages



Troubleshooting: Data in Epic?

- Always check Epic first! Data can be hidden by users in Anesthesia interop and Flowsheets
- Confirm:
 - Correct DEV record is attached
 - In flowsheets: device data is not hidden

Device

Current Associations

NRN OR-51 MGH

Associated at: 0824

ANES OR-51 MGH

Device type: Capsule Anesthesia Machine

MON OR-51 MGH

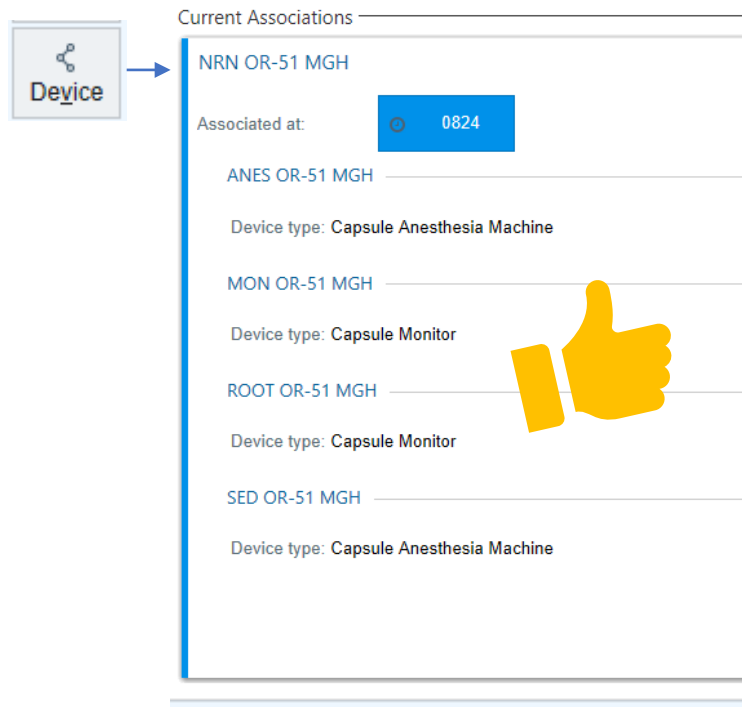
Device type: Capsule Monitor

ROOT OR-51 MGH

Device type: Capsule Monitor

SED OR-51 MGH

Device type: Capsule Anesthesia Machine



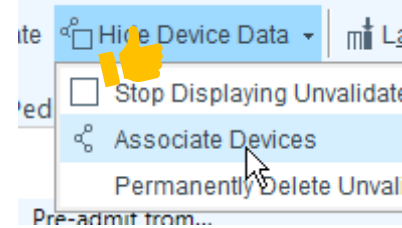
ite Hide Device Data

ted Stop Displaying Unvalidate

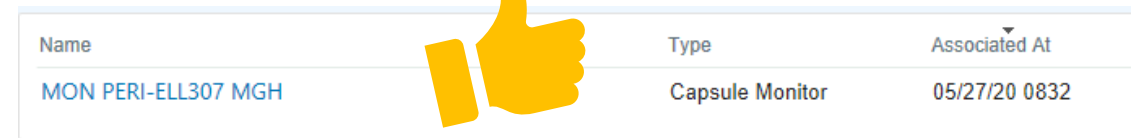
Associate Devices

Permanently Delete Unval

Pre-admit from...

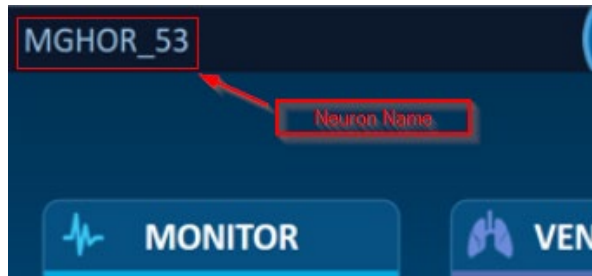


Name	Type	Associated At
MON PERI-ELL307 MGH	Capsule Monitor	05/27/20 0832



Troubleshooting: Data in Ensemble?

- Ensemble MDEV Message View: <http://ensutils.partners.org/MDEV/Recipients.aspx>
- Search by Neuron name in filter string



Basic Settings

Environment:

Application:

Source:

Basic Settings (Cont.)

Event Type:

Target:

Status:

Dates/Filters

Start Date:

End Date:

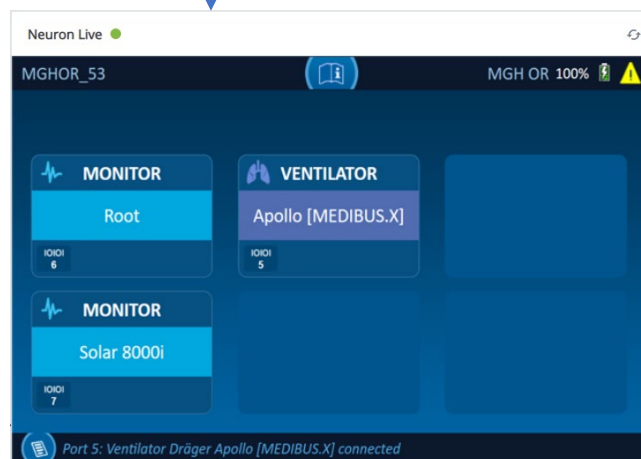
Filter String:

Source	Application Service EventType	Target	Date/Time Received Date/Time Sent	Pat_Name_(PID-5) Pat_Id_List_(PID-3) Device	Recipient_Message_Status
Source Message	MGH Capsule 3283a_MGH_Capsule_ORU_HL7_in ORU^R01	541359_Epic_HL7_TCP_out Target Message Target Response	5/27/2020 8:47:00 AM 5/27/2020 8:47:00 AM	N/A N/A MGHOR_53^ANES1	*Sent*
Source Message	MGH Capsule 3283a_MGH_Capsule_ORU_HL7_in ORU^R01	541359_Epic_HL7_TCP_out Target Message Target Response	5/27/2020 8:46:00 AM 5/27/2020 8:46:00 AM	N/A N/A MGHOR_53^ANES1	*Sent*

Troubleshooting: Neuron connected?

- Neurons can be updated and viewed through C3: <https://phsweb1517/login>
- C3 hub view allows you to confirm the Neuron (hub) is active and devices are connected

Hub ID	Location	Status	Devices
00187DC8F97C	MGHOR_53	Connected	3



Clicking on the “Hub ID” link will take you to a page showing the current configuration of the Neuron, including a live view of the Neuron display

Advanced: MPI ID Conventions

- “MPI ID” is the unique identifier for a device
- The identifier is sent in two separate parts out of Smartlinx: PV1-3.1 and 3.3.
- 3.1 contains the Neuron name and 3.3 has the DIM Tag
- Those two components are put together on receipt into Epic to be read as the MPI ID

Ensemble message:

```
1MSH|^~\&| DATACAPTOR|. . . | 20200603082200.498-0400|. . | ORU ^ R01 | 0603082
2PID|. .
3PV1|. . | I | MGHOR_53 ^ . ^ ANES1 |.
4OBR|. . . | . . . | 20200603082200.000-0400|. . . | MGHOR_53|. . . | MGHOR_53|. .
```

Annotations in the image:
- A red arrow labeled "Neuron name" points to the text "MGHOR_53" in the 3PV1 line.
- A red arrow labeled "DIM ID Tag" points to the text "ANES1" in the 3PV1 line.


Epic DEV build:

Rel	5000-MPI: ID TYPE	5001-MPI: ID
0	1. 1	1. 1 <i>Combined</i>
1	1. DEVICE [12]	1. MGHOR_53-ANES1

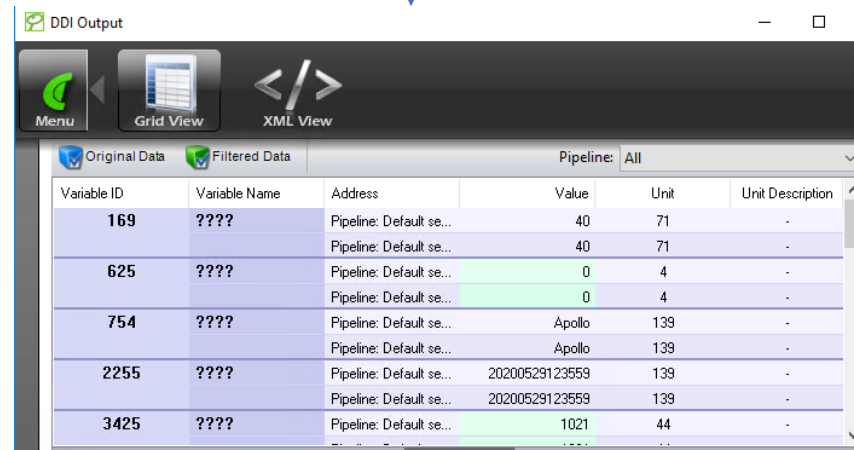
Advanced: Neuron data view

- Data captured from the device at the Neuron can be viewed
- Must connect from C3 on the server hosting the Neurons current connection
- Previewing live data is available from the Neuron Details page in C3

Port	Device ID	Status	Manufacturer	Model	Type
5	{10546248-2D...	Connected	Dräger	Apollo [MEDIB...	-



Variable IDs in the DDI Output live view can be referenced in the Help File available on the Capsule customer portal.



Variable ID	Variable Name	Address	Value	Unit	Unit Description
169	????	Pipeline: Default se...	40	71	-
625	????	Pipeline: Default se...	0	4	-
754	????	Pipeline: Default se...	Apollo	139	-
2255	????	Pipeline: Default se...	20200529123559	139	-
3425	????	Pipeline: Default se...	1021	44	-

Advanced: Smartlinx DMM Stack

- In Smartlinx, device data from a Neuron or Axon is filtered and transformed by Data Management Modules (DMMs)
- DMMs allow us to set frequency of data collection, parameter selection and other rules that determine final format and volume of data sent to downstream systems
- Rules are additive, with rules on top of GUI applied first

The screenshot displays the Smartlinx DMM Stack interface. At the top, there are control buttons: 'Save and Apply All', 'Start DMM', 'Stop DMM', 'Start All', and 'Stop All'. A dropdown menu shows 'Pipelines: Default server pipeline'. The main area is divided into two panes. The left pane lists various DMMs with their status (activated or disabled) and a 'Filter disabled and up to date' message. The right pane shows a detailed view of the 'Data Selection' module, which is currently active. It features a table with columns for 'Variable', 'Device Name', and 'DI'. The table lists various respiratory and ventilatory parameters for three devices: Apollo, Fabius Tiro, and Fabius MRI. Below the table, there are control buttons for '+ Add rule', 'Remove rule', 'Remove all rules', 'Copy rule', 'Move rule up', and 'Move rule down'. A status bar at the bottom indicates 'Data Selection' and provides a description: 'This DMM selects the variables to remove from or keep in the data stream.'

Variable	Device Name	DI
Respiration Rate (CO2), 23		Dr
Tidal Volume, 60		Dr
Ventilation Mode, 584		Dr
Inspired Desflurane, 593		Dr
Expired Desflurane, 594		Dr
Inspired Sevoflurane, 595		Dr
Expired Sevoflurane, 596		Dr
Inspired Isoflurane, 605		Dr
Expired Isoflurane, 606		Dr
Expired O2, 634		Dr
Inspired O2 (FiO2), 635		Dr
Inspiratory Pause Setting, 780		Dr
Positive End Expiratory Pressure (PEEP), 1189		Dr
Minute Volume, 1307		Dr
Mandatory Respiration Rate Setting, 1320		Dr
Tidal Volume Setting, 1321	Apollo	Dr
Tidal Volume Setting, 1321	Fabius Tiro	Dr
Tidal Volume Setting, 1321	Fabius MRI	Dr
Pressure Support Level Above PEEP Setting, 1332		Dr
Inspiratory Flow Trigger Setting, 1383		Dr

Advanced: Smartlinx Outputs

- Output connectors send HL7 messages to defined recipients
- Can be configured using a number of different profiles
- Each output has a corresponding “loopback” – a broadcast port that we can view messages in the same configuration as the output.

Advanced: HL7 Loopbacks

- Loopbacks should be stopped when not in use to conserve resources on the server