Clinical Data Transmission
Preparing for Patient Arrival and Care

Application Note


From the moment ALS responders arrive on the scene of a critical care patient, their hands are full stabilizing the patient and preparing for transport. Whether the patient is suffering a cardiac event, stroke, trauma or some other critical care condition, the immediate focus is on patient care. In these situations, ALS responders have little, if any, time to document, manually transmit data, or call ahead to medical control or the receiving hospital to advise that they are inbound. How then can this information be conveyed in a timely manner to alert emergency departments and treatment centers of the clinical status of inbound patients?

It has already been established that transmitting prehospital ECGs and 12-lead ECG reports to the hospital can help reduce first-medical-contact-to-balloon or door-to-balloon (D2B) time for patients in need of percutaneous coronary intervention (PCI)\(^1,2\). For patients suffering ST-segment elevation myocardial infarction (STEMI), EMS agencies and PCI hospitals are working together to create regional STEMI networks in their service areas to link responder agencies with receiving centers. This link results in significant conformity to a D2B time of less-than or equal to 90 min, and surpassing the American College of Cardiology D2B Alliance benchmark\(^3\). These same networks can also be leveraged to support more than just STEMI patients. Similarly, EMS personnel have transmitted ECGs to offsite cardiologists via a fully automated wireless network, resulting in shortened D2B times (63 min. average), as well as other reduced infarct size and shortened length of hospital stay.\(^4\)

You can support all types of critical care patients when EMS agencies and PCI hospitals automatically receive patient vitals, 12-lead ECG reports, rhythm strips, and other clinical data on a periodic or event-driven basis through appropriate data transmission solutions.

This application note describes the basic components of an emergency care clinical data transmission network, how they function, and what is needed to put them into action.
Clinical Data Transmission Solutions

Philips offers a suite of open data management solutions that streamline information delivery in an effort to optimize patient care and operational efficiency. One of these is focused on emergency care clinical data transmission from the ambulance to either the medical control office or directly to the receiving hospital. From there, this data can be shared with the emergency department and other specialists such as cardiologists, surgeons, neurologists, and respiratory therapists.

Send from the point of care

The solution begins with a Philips HeartStart MRx Monitor/Defibrillator. The MRx is a multi-modality ALS monitor capable of delivering electric therapy for pacing, cardioversion and defibrillation. It can be equipped with cellular, WiFi (Wireless Link), and/or Bluetooth wireless technology to send data to the hospital ahead of the patient.

Once connected to the internet, the MRx is able to send data to Philips’ HeartStart Telemedicine System, a software application that receives, stores, and forwards the clinical data to a number of destinations. With the push of a few buttons on the MRx, 12-Lead reports and periodic clinical data can be sent to pre-configured distribution lists via the Telemedicine System. Figures 1-3 illustrate the end-to-end Wireless Link and Bluetooth data transmission flows.

NOTE: Only 12-Lead ECGs can be transmitted to Philips’ TraceMasterVue ECG database.

Figure 1  End-to-end Wireless Link 12-Lead Transmission

![Diagram of the end-to-end Wireless Link 12-Lead Transmission process]
Prepare and respond at the receiving center

HeartStart Telemedicine System software can reside on a server at an EMS dispatch center, medical control, one hospital, or a number of hospitals.
Clinical Data Transmission

The HeartStart Telemedicine System can be shared among EMS agencies and can serve multiple hospitals and destinations in a regional network. A viewer component (HeartStart Telemedicine Viewer) allows clinicians or system administrators to interact with patient data found on the server and perform limited tasks, such as forwarding events to a variety of locations.

Figure 4 depicts the type of information available when looking at a “patient’s view” on the PC installed with the HeartStart Telemedicine Viewer. In one glance, you can see the latest data on a particular patient and consult with medics in the field, as needed.
Reports can be generated from the HeartStart Telemedicine System and printed or emailed. They can also be attached to electronic medical records to provide a complete clinical picture, including pre-hospital status, presenting rhythms, and historical trends. Figure 5 illustrates sample 12-lead, waveforms, and vital trends.

Figure 5  Telemedicine System Reports

12-Leads

Waveforms

Vital Trends
Figure 6 depicts a typical HeartStart Telemedicine System hospital implementation. Here patient data is received by HeartStart Telemedicine Server and viewed on various machines installed with HeartStart Telemedicine Viewer.

Figure 6  **Typical Telemedicine System Hospital Implementation**

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**Clinical Data Transmission Benefits**

Philips' emergency care clinical data transmission solutions provide benefits to both EMS and hospital organizations.

For EMS, it means:

- **Hands-free, hassle-free transmission**
  
  Start data transmission. Then, forget it, so you can keep your focus on patient care.

- **Informed clinical support for help with critical patients**
  
  Screen unnecessary transports and get assistance (from the receiving hospital) with patients who are refusing transport.

If there is a dispatch or call center involved in the EMS system, personnel can see patient clinical status and provide medics remote support for critical patients. If needed, they can direct the medics to a more appropriate facility.

The net result? A more informed emergency department (ED) means shorter handoffs that enables you to reduce out-of-service times and to meet service level commitments.

For a receiving hospital, it means:

- **Advanced notice of inbound critical care patients**
  
  You'll have legible, objective data in hand to reduce manually recorded and verbally recalled information.

- **Making appropriate decisions**
  
  Find a bed for a patient, consult a specialist as required (or not), and refer to a patient’s history.

The net result? A more informed receiving team may be able to reduce a patient’s stay in the ED and better utilize the Cath Lab, Radiology, Surgery, and/or ICU.

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**Conclusion**

Critical care patients require timely and accurate collaboration between EMS and receiving medical facilities. Meeting this requirement means adoption of new technology to streamline operations and increase access to and use of patient information.

Philips understands this requirement. Philips provides flexible, traceable, and easy-to-use data transmission solutions for exceptional patient care and operational efficiency in the field and in the hospital. And these solutions come with no contracts. Clinical data
transmission is just one part of a suite of data management solutions. Others include quality review software, data integration, and streamlining Event Summary file management workflow. For more details, please contact your Philips account representative or visit www.philips.com.

## Hardware and Software Requirements

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<thead>
<tr>
<th><strong>HeartStart MRx Software Version</strong></th>
<th><strong>Gateway/router Technology (instead of cell phone)</strong></th>
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<tbody>
<tr>
<td>T.00 or higher and Wireless Link option*</td>
<td><strong>ISM Band</strong>: 802.11b and 802.11g using the 2.4 GHz ISM band</td>
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<tr>
<td><em>Wireless Link options</em></td>
<td><strong>Security and Encryption</strong>: WEP (64/128 bit), WPA-PSK (TKIP/AES), WPA2-PSK (AES/TKIP)</td>
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<tr>
<td>- D01 MRx Wireless Link – Generic (WiFi)</td>
<td><strong>Supported Cellular Technology (2G and 3G)</strong></td>
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<tr>
<td>- D02 MRx Wireless Link – Verizon (US only)</td>
<td>- GSM/GPRS/EDGE: 850/900/1800/1900 MHz</td>
</tr>
<tr>
<td>- D03 MRx Wireless Link – AT&amp;T (US only)</td>
<td>- UMTS/HSDPS/HSUPA: 800-850/900/1900/2100 MHz and AWS band (1700/2100 MHz) (B1, B2, B4, B5, B8)</td>
</tr>
<tr>
<td><strong>Wireless Link upgrades</strong></td>
<td>- CDMA 1xRTT/EV-DO rev0/EV-DO revA: 800/1900 (BC0, BC1)</td>
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<tr>
<td>- 860378 MRx Wireless Link – Generic (WiFi)</td>
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<tr>
<td>- 860376 MRx Wireless Link – Verizon (US only)</td>
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<tr>
<td>- 860377 MRx Wireless Link – AT&amp;T (US only)</td>
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<tr>
<td><strong>B.05 or later for 12-Leads</strong> (Option B06 or upgrade M3801A*)</td>
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<tr>
<td><strong>F.01 or later for Periodic Clinical Data Transmission</strong> (Option B18 or upgrade 861443*)</td>
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*Bluetooth* card 989803153411 may be needed with upgrade

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<tr>
<th><strong>Bluetooth</strong> Wireless Technology Software and Hardware for cell phone</th>
<th><strong>Bluetooth</strong> software to support protocol version 1.1 or higher</th>
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<tr>
<td><strong>Bluetooth</strong> Dial Up Networking Profile</td>
<td><strong>Tethering data plan</strong> (Consult your cell phone service provider)</td>
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</table>
**HeartStart Telemedicine System 4.2**

### Software
- **Operating system**
  - For HeartStart Telemedicine Server
    - *Required:* Microsoft® Windows Server 2008 R2 or Windows 7 that run with the corresponding Microsoft Internet Information Service (IIS)
    - *Recommended:* 64-bit Microsoft Windows 7
  - For HeartStart Telemedicine Viewer
    - *Required:* 32- or 64-bit Microsoft Windows 7

### Hardware
- **Processor speed**
  - For HeartStart Telemedicine Server and HeartStart Telemedicine Viewer
    - *Minimum:* 1 GHZ or higher

### Display
- For HeartStart Telemedicine Server and HeartStart Telemedicine Viewer
  - *Minimum:* 1024 x 768
  - *Recommended:* 1280 x 1024 or higher

### Memory
- For HeartStart Telemedicine Server
  - *Minimum:* 2 GB
- For HeartStart Telemedicine Viewer
  - *Minimum:* 1 GB

### Disk space
- For HeartStart Telemedicine Server and HeartStart Telemedicine Viewer
  - *Required:* 20 GB for database storage

### CD-ROM drive
- For HeartStart Telemedicine Server and HeartStart Telemedicine Viewer
  - *Required:* 1 analogue telephone line for each machine

### Accessories
- Includes fax modem, printer, Bluetooth adapter, and Bluetooth stack

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  - For HeartStart Telemedicine Viewer
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- **Server**
  - For HeartStart Telemedicine Server to configure the HeartStart Telemedicine system, database, and web service
    - *Required:*
      - Microsoft SQL Server 2008 R2 Express Edition, 10 GB of data capacity
      - IIS Server for Windows Server 2008 R2
      - IIS Server for Windows 7
  - **SMTP Server:** For HeartStart Telemedicine Server to forward emails (e.g., Auto Sent List)
  - **Bluetooth**
    - *Required:* Version 1.1 or higher

- **Accessories**
  - Includes PDF Reader, back up and restore tool, and email application
Wireless Link Hardware

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<thead>
<tr>
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<tr>
<td>Wireless Link (AT&amp;T)</td>
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<td>Wireless Link (Generic)</td>
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<td>Wireless Link Cable Kit</td>
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References


