Installation and Configuration Guide

IntelliVue Patient Monitor
MX450, MX500, MX550

Remote Application Setup
Release K.2 with Software Revision K.2

Patient Monitoring
Table of Contents

1 Introduction
   Finding the Information You Need 5
   Warnings and Cautions 6
   Trade Mark and License Acknowledgments 6
   Manufacturer's Information 6

2 System Description
   Introduction 7
   Topology 7

3 Network Requirements/Prerequisites

4 Configuration
   Configuration at the Support Tool Mark2 13
   Saving and Loading the Remote App Settings 18

5 Validation Test

6 Troubleshooting

Index
Introduction

This installation and configuration guide covers the technical pre-requisites to allow display and operation of pre-configured remote applications on a patient monitor screen for the MX450, MX500, and MX550.

Applications can be hosted on a Citrix XenApp® server or a standard PIIC iX Web server. The monitor connects via:

• a Citrix Receiver™ to the Citrix XenApp® server
• a PIIC iX Web client to the PIIC iX Web server (LAN or WLAN).

Finding the Information You Need

This guide is intended for use by technical staff responsible for the provision of remote applications for use with IntelliVue patient monitors MX450-550. The provision of remote applications requires interaction with other devices and applications. Here are some pointers to help you find the relevant information:

Remote applications as covered in this guide can be used with MX450-550 patient monitors. For further information about the configuration of these patient monitors, please refer to the IntelliVue Patient Monitor Configuration Guide.

For further information about configuration tasks involving the IntelliVue Support Tool Mark2, please refer to the IntelliVue Support Tool Mark2 Instructions for Use.

Clinical Configuration Guides

• Philips IntelliVue Information Center Release N Configuration Guide
• Clinical Configuration Guide IntelliVue Information Center iX Release A.01/A.02

Technical Configuration Guides

• IntelliVue Information Center System Release N Installation and Service Manual
• Philips IntelliVue Information Center System Release N,01 Installation and Service Guide
• IntelliVue Information Center iX Service and Installation Guide
• Installation Guidelines and Topologies
• IntelliVue Network Specification
• IntelliVue Information Center iX Security for Clinical Networks
Warnings and Cautions

In this guide:

• A **warning** alerts you to a potential serious outcome, adverse event or safety hazard. Failure to observe a warning may result in death or serious injury to the user or patient.

• A **caution** alerts you where special care is necessary for the safe and effective use of the product. Failure to observe a caution may result in minor or moderate personal injury or damage to the product or other property, and possibly in a remote risk of more serious injury.

Trade Mark and License Acknowledgments

Citrix®, Citrix Receiver™, XenApp®, and ICA® are trademarks of Citrix Systems, Inc. and/or one or more of its subsidiaries, and may be registered in the United States Patent and Trademark Office and in other countries.

Manufacturer's Information

You can write to Philips at this address:
Philips Medizin Systeme Boeblingen GmbH
Hewlett-Packard-Str. 2
71034 Boeblingen
Germany

Visit our website at: www.healthcare.philips.com

© Copyright 2014. Koninklijke Philips N.V. All Rights Reserved.
System Description

Introduction

IntelliVue MX450-550 patient monitors use the Citrix Receiver™ from Citrix Systems Inc. and/or a web application client to integrate applications running on a remote server into the local user interface. This technology enables a server-based computing where applications are deployed, managed, supported, and executed on a remote server.

In this model, the application program is executed on the server machine, while the display is exported to the client device (here the patient monitor). Any input made at the client (touchscreen input, keyboard, mouse events) is sent back and processed by the server.

Topology

Citrix XenApp®

The Citrix XenApp® server works as terminal server application and hosts all remote applications. The patient monitor embeds a Citrix Receiver™. The firewall (free ports) and the gateway between the hospital network and the clinical network have to be configured so that a patient monitor can send a
request to the server, and that the server can send data packages to the client. The patient monitor sends an HTTP request over TCP/IP to get a list of published applications. The remote session will be initiated via a request of the client. The server then sends a data package to the patient monitor. The remote applications are initiated at the monitor. The patient monitor limits the data traffic to 2 Mbit/s. It is recommended to set the Citrix XenApp® server to also 2 Mbit/s with the configuration parameter **Overall session bandwidth limit**. To make the appropriate changes on the Citrix XenApp® server, please refer to the Citrix guidelines for this configuration and any further options to optimize application performance on networks with bandwidth restrictions. Every 30 minutes the monitor updates its list of available remote applications.

**PIIC iX Web Server**

The PIIC iX web server hosts the PIIC iX website. The patient monitor works as a web client. The patient monitor enables access to the web site. It sends an HTTP(S) request over TCP/IP to the PIIC iX web server to access the PIIC iX web site. The server cannot initiate a request, only the client can. The patient monitor also limits the data traffic to 2 Mbit/s. Only the PIIC iX data belonging to the patient assigned to the patient monitor can be viewed.
Citrix XenApp® and PIIC iX

The two solutions can be combined to operate parallel. They function the same as described above.
Network Requirements/Prerequisites

Citrix XenApp®


to connect a Citrix XenApp® and the Citrix Receiver™:

• the hospital IT has to provide to Philips the IP addresses, domain names, and log-in information of the Citrix XenApp®. The log-in information is an option, if no log-in information is given, the user has to log in at the monitor for each remote application started there.

• firewalls and gateways have to be configured to allow traffic from inside the Philips network to the outside Philips network and back.

• all switches, routers, proxy servers on the hospital IT side have to be configured to enable data communication. Follow the instructions of the IntelliVue Network Specification and the IntelliVue Information Center iX Security for Clinical Networks document.

• the hospital IT is responsible for selecting and configuring the published remote applications on the Citrix XenApp® server.

• the bandwidth for the session with the Citrix XenApp® is limited by the patient monitor to 2 Mbit/s. We recommend to set the Citrix XenApp® also to 2 Mbit/s in the configuration parameter Overall session bandwidth limit found in the User Policies section of the Citrix XenApp® server. To make the appropriate changes on the Citrix XenApp® server, please refer to the Citrix guidelines for this configuration and any further options to optimize application performance on networks with bandwidth restrictions.

<table>
<thead>
<tr>
<th>Description</th>
<th>Port Name</th>
<th>TCP</th>
<th>Source Port</th>
<th>Destination Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application List Request</td>
<td>HTTP</td>
<td>TCP</td>
<td>Dynamic</td>
<td>80</td>
</tr>
<tr>
<td>Citrix Receiver Connection</td>
<td>ICA</td>
<td>TCP</td>
<td>Dynamic</td>
<td>1494</td>
</tr>
</tbody>
</table>
PIIC iX Web Server

The PIIC iX web server is a Philips installation. See the Installation guide for the PIIC iX and the IntelliVue Information Center iX for details.

- The required ports for the web server are 80, 8080, and 443.

<table>
<thead>
<tr>
<th>Description</th>
<th>Port Name</th>
<th>TCP</th>
<th>Source Port</th>
<th>Destination Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web</td>
<td>HTTP</td>
<td>TCP</td>
<td>Dynamic</td>
<td>80/8080</td>
</tr>
<tr>
<td>SecureWeb</td>
<td>HTTPS</td>
<td>TCP</td>
<td>Dynamic</td>
<td>443</td>
</tr>
</tbody>
</table>
Configuration

With the Support Tool Mark2 you can configure the communication parameter for the Citrix Receiver™ and PIIC iX Web.

The Remote App Setup can either be set for a Citrix Receiver™, or a PIIC iX Web, or for both, depending on customer requirements, system configuration, and the topology of the hospital network. After an upgrade of a monitor, these settings are set back to the defaults.

You cannot clone the Remote App settings to other monitors, but you can deploy it to multiple connected monitors at the same time with the Support Tool Mark2, or you can save the Remote App settings on your PC and load it if needed. The Remote App settings are not visible at the monitor.

NOTE

When publishing remote applications with potentially sensitive information content, ensure that access to these applications on the patient monitor is appropriately controlled (e.g. require user name and password). Access to the application server systems must be limited to authorized persons.

Configuration at the Support Tool Mark2

Physically connect the patient monitor(s) to the network via LAN cable.

1 Select all the monitors in the device list of the Support Tool Mark2 you want to setup the Remote App Settings for.
2 Click on the button Set Remote App Settings in the Configuration/Report tab.
The window **Set Remote App Setting** opens.

To enable a section on the **Set Remote App Setting** window set enable the option box in that section. E.g. to activate the settings for the section **General**, check the option **Enable General**. Only the sections which are enabled are configured for the monitor. The following setting sections are available:
General Section

If the parameters of the General section are not set in the Support Tool Mark2, the monitor defaults are used for the settings CloseOnDischarge which is then set to Yes, and Startup Parameters which is then set to No.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| CloseOnDischarge      | **Yes**: The remote application is closed automatically whenever a patient is discharged from the monitor.  
|                       | **No**: The remote application remains open even if the patient is discharged at the monitor. |
| Startup Parameters    | **Yes**: Selecting this option patient related data can be passed to the remote application.  
|                       | The following patient data can be passed:  
|                       | • Internal Patient ID  
|                       | • First/Last Name  
|                       | • MRN  
|                       | • Weight  
|                       | • Height  
|                       | • Gender  
|                       | • Paced mode  
|                       | • Category BSA and BSA formula  
|                       | • Date of birth  
|                       | • Bed label  
|                       | • Equipment label  
|                       | **No**: Selecting this option no patient related information will be passed to the remote application. |

Parameter Parsing for the PIIC iX Web

The PIIC IX Web App always receives bed and unit label independent of the setting which is set for parameter parsing.
Parameter Parsing for the Citrix Receiver

The Citrix Receiver™ sends information about the patient admitted at the monitor when starting a published application. The parameters sent are the following:

- BedLabel
- PatId
- UnitLabel
- MRN
- EquipmentLabel
- FirstName
- LastName
- PacedMode
- PatientSex
- PatientAge
- PatientHeight
- PatientWeight
- BSA
- BSAFormula
- DateOfBirth

They are grouped as name/value pairs connected by '='. The name/value pairs are interconnected by an '&'. The names of the name/value pairs can be looked up in the above table. This formatting follows the way URL parameters are passed in HTTP GET requests. The encoding of special characters is done as well in the URL standard way. Please be aware, that some parameters might only contain placeholders instead of patient data, because there maybe not all of the above information available in the monitor.

Example:

```
BedLabel=Bed2&PatId=12345678&UnitLabel=Ward4&MRN=87654&EquipmentLabel=ICN15N2&FirstName=John&LastName=Doe&PacedMode=0&PatientSex=m&PatientAge=50&PatientHeight=176.0cm&PatientWeight=79.0kg&BSA=2m2&BSAFormula=1&DateOfBirth=20-JUN-1964
```

In order to use the passed parameters, the published application needs to be set up with the special option "%*" on the command line, to indicate that the application is interested in the parameters passed by the client. For detailed information on how to publish an application and receive parameters passed by the Citrix Receiver™ see the Citrix XenApp® Server documentation.

For published applications not interested in patient information, the special option can be omitted, but information is sent anyway by the Citrix Receiver™.

If the published application is not capable to parse the parameters in the given form, it needs to be wrapped by an entity, that is able to parse the parameters in the given form and pass it to the application.
# Parameter Mapping

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Placeholder</th>
<th>Type</th>
<th>Max. Length</th>
<th>Possible Values - Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>BedLabel</td>
<td>-b</td>
<td>String</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>PatId</td>
<td>-i</td>
<td>String</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>UnitLabel</td>
<td>-u</td>
<td>String</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>MRN</td>
<td>-m</td>
<td>String</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>EquipmentLabel</td>
<td>-e</td>
<td>String</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>FirstName</td>
<td>-f</td>
<td>String</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>LastName</td>
<td>-l</td>
<td>String</td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>
| PacedMode          | -p          | Digit    | 1           | 0 - not paced  
1 - paced  
2 - paced unconfirmed |
| Gender             | -s          | Char     | 1           | m - male  
f - female  
u - unknown |
| PatientAge         | -a          | Measure  | 30          | NaN (means unknown) up to 30 digits |
| PatientHeight      | -h          | Measure  | 30          | NaN (means unknown) up to 30 digits |
| PatientWeight      | -w          | Measure  | 30          | NaN (means unknown) up to 30 digits |
| BSA                | -r          | Measure  | 30          | NaN (means unknown) up to 30 digits |
| BSAFormula         | -c          | Digit    | 1           | 0 - Formula unspecified  
1 - Formula Boyd used  
2 - Formula Dubois used |
| DateOfBirth        | -x          | String   | 12          | DD-MMM-YYYY |

All parameters are contained in one String:

- **String** describes a String which can contain all numbers and letters of the alphabet, also some special characters are allowed.
- **Digit** describes one digit (0 .. 9).
- **Char** means only one character will be received (a..z) (A..Z).
4 Configuration

Units

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>m</td>
<td>meter</td>
</tr>
<tr>
<td>cm</td>
<td>centimeter</td>
</tr>
<tr>
<td>mm</td>
<td>millimeter</td>
</tr>
<tr>
<td>µm</td>
<td>micrometer</td>
</tr>
<tr>
<td>in</td>
<td>inch</td>
</tr>
<tr>
<td>g</td>
<td>gram</td>
</tr>
<tr>
<td>kg</td>
<td>kilogram</td>
</tr>
<tr>
<td>mg</td>
<td>milligram</td>
</tr>
<tr>
<td>µg</td>
<td>microgram</td>
</tr>
<tr>
<td>ng</td>
<td>nanogram</td>
</tr>
<tr>
<td>lb</td>
<td>pounds</td>
</tr>
<tr>
<td>oz</td>
<td>ounce</td>
</tr>
<tr>
<td>m²</td>
<td>square meter</td>
</tr>
<tr>
<td>in²</td>
<td>square inch</td>
</tr>
</tbody>
</table>

Citrix Receiver Section

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>User</td>
<td>The User and Password data has to be entered here so the user does not have to log-in at the monitor. If no entry is made here, then depending on the configuration of the server, a log-in window is shown at the monitor when calling up a remote application, and the user has to enter the corresponding user name and password.</td>
</tr>
<tr>
<td>Password</td>
<td></td>
</tr>
<tr>
<td>Domain</td>
<td>The data for the domain and IPv4 address has to be provided by the hospital IT department.</td>
</tr>
<tr>
<td>IPv4 address</td>
<td></td>
</tr>
</tbody>
</table>
PIIC iX Web Section

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIIC iX Host Name</td>
<td>The data needed for this section has to be either provided by the hospital IT department, or can be copied from the settings of PIIC iX. The PIIC iX (IPv4, host name, and login) settings should be the same as the one set up at the monitor, or the start up parameter transfer will not work.</td>
</tr>
<tr>
<td>PIIC iX IPv4 address</td>
<td></td>
</tr>
<tr>
<td>User</td>
<td>If no entry is made here, then depending on the configuration of the server, a log-in window is shown at the monitor when calling up a remote application, and the user has to enter the corresponding user name and password.</td>
</tr>
<tr>
<td>Password</td>
<td></td>
</tr>
<tr>
<td>HTTPS Support</td>
<td>Depending on the configuration of the web server in PIIC iX, if the SSL encryption is enabled or not, you have to select either Yes for encrypting the traffic, or No for not encrypting the traffic. If you configure HTTPS Support to No, the User and Password settings are sent in readable text to the web server.</td>
</tr>
</tbody>
</table>

Saving and Loading the Remote App Settings

You do not have to re-enter all the parameters for the Remote App Setting every time you restart the Support Tool Mark2. You can save and load the settings.

Saving the Remote App Settings

1. After you have entered all required parameters, click on the button **Save**.
2. The Windows Explorer opens and you can select your destination, and save the file under any name.
3. The pop-up window **Enter Password** opens. Enter any password for the file, at least 4 places long, and click on the button **OK**. This password has to be entered when you open the Remote App Settings.

Loading the Remote App Settings

1. Open the Remote App Settings window.
2. Click on the button **Load**.
3. The Windows Explorer opens. Select your saved file and click the button **Open**.
4. The pop-up window **Enter Password** opens. Enter your password for the file, and click on the button **OK**.
Validation Test

To display remote applications on the monitor,

1. In the **Main Setup** menu, select **Remote Apps**, or select the **Remote Apps** SmartKey.

2. Select the required application from the pop-up list of available applications. The customer decides which remote applications are hosted on Citrix XenApp®.

3. Operate the application with your preferred monitor input device: touchscreen, keyboard, or mouse.

4. Perform the validation test for all available remote applications.

<table>
<thead>
<tr>
<th>Action</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter the <strong>Main Setup</strong> menu.</td>
<td>Check that the <strong>Remote Apps</strong> menu entry is present and black.</td>
</tr>
<tr>
<td>Select <strong>Remote Apps</strong> in the menu.</td>
<td>Check that a pop-up list of available applications appears.</td>
</tr>
<tr>
<td>Select an application from the list.</td>
<td>Check that the application opens and appears correctly.</td>
</tr>
<tr>
<td>Operate the application with various monitor input devices, as available: touchscreen, keyboard, or mouse.</td>
<td>Check correct operation.</td>
</tr>
<tr>
<td>Enter the window of the remote application that should have the Start up Parameters listed.</td>
<td>Check if the Start-up Parameters were transferred correctly.</td>
</tr>
</tbody>
</table>

**NOTE**
The PIIC iX Web application at the patient monitor only supports retrospective single patient data.
5 Validation Test
## Troubleshooting

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Cause of Failure</th>
<th>Failure Isolation and Remedy</th>
</tr>
</thead>
</table>
| The **RemoteApplics** menu item is grayed out in the menu. | The monitor has no IP address.  
The monitor is not connected to the network. | Check the network WLAN/LAN connection.  
Check if the network symbol is active on the monitor's screen. |
| | The Philips network is not responding. | Check that the Philips network is running correctly. |
| | The firewall blocks data transfer. | Check that all firewalls, switches, and routers are correctly configured by the hospital IT department. |
| | The Remote App settings are incorrect. | Use a PC to look on the Citrix XenApp® if you can see the Remote App list. If it is there, Check the Remote App setting at the Support Tool Mark2, you might have mistyped an entry. |
| The **RemoteApplics** menu item is black in the menu, but no remote application can be called up. | The **Remote Applics** menu item stays black once the monitor had a connection, even if the connection is then lost. | Check the network configuration.  
For PIIC iX: Reload and check the Remote App settings and compare them to the PIIC iX settings, if they are correct.  
Reboot the monitor and check if the menu item is then grayed out. |
| Newly published remote applications are not visible at the monitor. | The monitor refreshes the remote apps list every 30 minutes. | Either wait until the 30 minutes are up, or reboot the monitor. |
| PIIC iX is not listed in the Remote Apps list at the monitor. | The monitor is not assigned in the PIIC iX to a sector, and has therefore no bed label. | Assign the monitor to a sector in PIIC iX. |
B
bandwidth 11

C
Citrix gateway 11
Citrix Receiver Section 18
Citrix XenApp 5
Configuration 13
Configuration at the Support Tool Mark2 13

F
Finding the Information You Need 5

G
General Section 14

I
Introduction 5, 7

M
Manufacturer’s Information 6

N
Network Requirements/Prerequisites 11

P
Parameter Mapping 16
Parameter Parsing for the Citrix Receiver 15
Parameter Parsing for the PIIC IX Web 15
PIIC IX server 5
PIIC IX Web Section 18
pre-configured applications 5

R
Remote App Setting 13
Remote App Setup 13
Setup Remote Applications 13
required ports 11

S
Saving and Loading the Remote App Settings 18
System Description 7

T
technical pre-requisites 5
Topology 7
Trade Mark and License
  Acknowledgments 6
Troubleshooting 23

U
Units 17

V
Validation Test 21

W
Warnings and Cautions 6