



Leading with choice

Philips Smart-hopping clinical wireless networking

Our clinical wireless networking options

Philips patient monitoring solution supports a choice of wireless networking: Philips Smart-hopping¹ or Wi-Fi/802.11² in a common deployment for Philips patient monitoring and ambulatory patient monitoring.

Which wireless network is right for you?

Due to the many variables that can affect wireless communication, occasional signal loss cannot be prevented.³ To choose a wireless technology, you must first consider how a momentary loss of signal can impact patient monitoring, the expectations of the clinical staff, and the risk management policies of the hospital.⁴

- **When wireless is optional:** In care units where wireless patient monitors are used, the clinical workflow and alarm management is typically centered around the patient in the room. Wireless communication to the central station is secondary since the alarms are managed at the bedside.
- **When wireless is required:** In care units where ambulatory patient monitors are used, the clinical workflow is typically at the central station. Wireless communication to the central station is required as it performs the alarm notification.

Wireless networking works optimally in an environment of high signal strength, low noise and efficient channel reuse. This makes wireless network design and management critical to maintaining performance. Here are some examples of network congestion and interference to consider:

- Access Points (APs) operating on the same channel creating cross-channel interference, creating channel connection between wireless cells, and reducing aggregate wireless network capacity

- Increasing device-to-AP density increasing channel contention and reducing capacity within a wireless cell
- Devices and applications sharing (and competing for) the same level of quality of service on the wireless LAN

In the case of patient-worn monitors, the patient's body may block the wireless signal or significantly reduce the received signal quality. Connection quality and coverage are critical considerations. Patient-worn monitors, which provide for real-time patient monitoring at a central station, require efficient roaming with low latency and minimal packet loss.

Considerations

Although there is no right or wrong choice in selecting between Philips Smart-hopping or WLAN, you should consider these three aspects:

- **Clinical/Functional** – how well does the solution meet the needs and support the workflow of the clinicians?
- **Operational** – how well does the solution align with your maintenance and support the clinical practice and workflow?
- **Financial** – how well does the solution perform as an investment to support your operational goals

The list in this document compares the two options available for Philips clinical wireless networks to help you make an informed choice, based on these four key considerations. Use the tick boxes to mark your preferences. The column with the highest number of tick marks indicates which option might be appropriate for your needs.

Please note the intention of this list is to help the discussion, not to make the choice for you.

Clinical considerations

Philips Smart-hopping

WLAN (802.11a/b/g/n)

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|--|--|
| <input type="checkbox"/> Minimal gaps in monitoring data, seamless roaming always is available by design when in range of access points. | <input type="checkbox"/> Gaps in monitoring data may occur because seamless roaming is not available across WLAN access points. |
| <input type="checkbox"/> Performance for audible alarms, surveillance (waves) and trend data is contingent on proper network management. | <input type="checkbox"/> Clinicians can tolerate some interruption in the flow of data to the central station, and need proper network management (as defined by IEC 80001-1:2010 or ANSI/AAMI/IEC TIR80001-2-3:2012). |
| <input type="checkbox"/> Philips takes responsibility and performs risk management for the wireless network. | <input type="checkbox"/> The hospital takes responsibility and performs risk management ⁴ for the wireless network. |

Operational considerations

Philips Smart-hopping (network supplied by Philips)

WLAN (802.11a/b/g/n)

- | | |
|--|--|
| <input type="checkbox"/> Proprietary solution supported by Philips. | <input type="checkbox"/> Hospital is responsible for supplying a commercial, often multi-purpose network infrastructure. ⁶ The network must be voice-over-WLAN quality, with Wi-Fi multimedia QoS properly configured. |
| <input type="checkbox"/> Operates on wireless medical telemetry service (WMTS) wavelengths, licensed by the FCC specifically for medical telemetry usage. (United States and Puerto Rico only) | |
| <input type="checkbox"/> Typically managed by hospital biomed (biomed/clinical skills required). | <input type="checkbox"/> Typically managed by hospital IT, including interoperability, co-existence with other devices and change management (requires advanced network administration skills). To achieve high-priority QoS, we recommend network management compliant with the IEC 80001 standard. |
| <input type="checkbox"/> Minimal interaction necessary. | <input type="checkbox"/> Continuous, mission-critical management necessary. |
| <input type="checkbox"/> Philips support available all day, all year. | |

Philips Smart-hopping (all networks)

- | | |
|--|---|
| <input type="checkbox"/> Make before break roaming: maintains synchronization when changing network access points (APs) thereby supporting seamless roaming. | <input type="checkbox"/> Break before make roaming: risk of dropped connections during transition between APs (particularly in network environments with lots of traffic or lots of devices). |
|--|---|

Financial considerations

Philips Smart-hopping

WLAN (802.11a/b/g/n)

- | | |
|---|--|
| <input type="checkbox"/> High initial equipment cost; considered a cost of the solution. | <input type="checkbox"/> Lower initial equipment cost (does not consider if the WLAN design meets patient monitoring performance requirements and possible remediation costs); considered a cost of the hospital IT infrastructure. |
| <input type="checkbox"/> Low maintenance costs, due to exclusive patient monitoring network. The intra-operability and co-existence of supported medical devices has been engineered by design. | <input type="checkbox"/> High costs can be attributed to management, support and administration. Unlike Smart-hopping networks, WLANs change all the time. The number of applications, the number of devices and even the RF environment changes. Health delivery organizations must continually measure the performance of WLAN and make adjustments regularly. |

Functional considerations for the IntelliVue MX40

Philips Smart-hopping

WLAN (802.11a/b/g/n)

- | | |
|---|---|
| <input type="checkbox"/> Device location (optional) integrated into the PIC iX including an INOP for "Out of Area" to indicate an association with an access point configured as a boundary area. | <input type="checkbox"/> Device location not supported. |
|---|---|

Functional considerations for portable bedside IntelliVue patient monitors

Philips Smart-hopping	WLAN (802.11a/b/g/n)
<input type="checkbox"/> Supports transmission of 4 waves to the PIC iX for storage. Selection of waves is not configurable and is based on internal bedside priority.	<input type="checkbox"/> Up to 28 (revision-dependent) physiological waves are available for real-time surveillance with PIC iX. Although the PIC iX stores up to 12 ECG leads for IntelliVue patient monitors, more leads may be derived and available for display.
<input type="checkbox"/> Up to 64 numerics trended with PIC iX.	<input type="checkbox"/> All numerics can be trended with PIC iX.
<input type="checkbox"/> Beat labeling is available on the IntelliVue patient monitor only.	<input type="checkbox"/> Beat labeling is available on the PIC iX and IntelliVue patient monitors.
<input type="checkbox"/> For IntelliVue patient monitors, the PIC iX can only remotely control the following: <ul style="list-style-type: none"> • Acknowledge • Monitor standby • NBP start/stop • HR limits 	<input type="checkbox"/> For IntelliVue patient monitors, the PIC iX has full remote controls including: <ul style="list-style-type: none"> • Acknowledge • HR limits • Monitor standby • Suspend • NBP start/stop • Alarm limits • Relearn • Equipment management • Arrhythmia controls
<input type="checkbox"/> 12 lead diagnostic capture without analysis on the IVPM only. 12 lead captures are not available on PIC iX for diagnosis or export.	<input type="checkbox"/> 12-lead diagnostic ECG capture with analysis at IVPM or PIC iX. 12-lead captures are available at both for diagnosis and export.
<input type="checkbox"/> Supports printing of PIC iX reports only. Reports sourced from IntelliVue patient monitors are not supported.	<input type="checkbox"/> Supports paper or electronic from either the PIC iX or the bedside monitor.
<input type="checkbox"/> ECG data is available on the PIC iX at 250 samples per second.	<input type="checkbox"/> Depends on licensing options. If 12-lead full disclosure is optioned, then ECG is 500 sps, otherwise it is 250 sps.
<input type="checkbox"/> ST and QT wave data are not available on the PIC iX for IntelliVue patient monitors.	<input type="checkbox"/> ST and QT wave data are available on the PIC iX for both IntelliVue patient monitors.
<input type="checkbox"/> Up to seven simultaneous alarms transmitted.	<input type="checkbox"/> All simultaneous alarms transmitted.
<input type="checkbox"/> Does not support bed-to-bed overview between IntelliVue patient monitors.	<input type="checkbox"/> Supports bed-to-bed overview between IntelliVue patient monitors, including overlooking IntelliVue MX40 patients from an IntelliVue patient monitor and other devices, such as a wireless X3. ⁷
<input type="checkbox"/> Does not support the Alarm Status overview bar feature between IntelliVue patient monitors.	<input type="checkbox"/> Supports the Alarm Status overview bar feature between IntelliVue patient monitors.
<input type="checkbox"/> Device location (optional) integrated into the PIC iX including an INOP for "Out of Area".	<input type="checkbox"/> Device location not supported.
<input type="checkbox"/> Up to 12 numerics from each EC10 IntelliBridge module are available to trend for HL7 export. Open interface EC10 drivers are not available.	<input type="checkbox"/> Up to 12 numerics from each EC10 IntelliBridge module are available to trend for HL7 export, including open interface EC10 drivers.
..... Total tick marks <input checked="" type="checkbox"/> in this column Total tick marks <input checked="" type="checkbox"/> in this column

¹ Philips Smart-hopping refers to Philips proprietary technology.

² Wi-Fi is unlicensed in the United States and follows 802.11 standards issued by IEEE.

³ Refer to the IntelliVue MX40 Instructions for Use for information on using wireless in a patient environment.

⁴ Refer to ANSI/AAMI/IEC 80001-1-:2010 Application of risk management for IT networks incorporating medical devices.

⁵ The MX40 provides best effort backfill of up to 10 seconds of interrupted waveforms, and up to 8 hours of numeric data, uploaded following restoration of network connection.

⁶ Contact Philips for more details on the Customer Supplied Network requirements or Smart-hopping network.

⁷ The IntelliVue patient monitor must have a LAN or WLAN connection.

	IntelliVue MX40		IntelliVue patient monitors	
	Philips Smart-hopping	WLAN (802.11a/b/g/n)	Philips Smart-hopping	WLAN (802.11a/b/g/n)
Maximum physiological waves transmitted	4	4	4	8 ECG and 20 other waves (total of 28 stored waves)
Best effort waveform backfill ⁵		up to 10 seconds		up to 10 seconds (revision and monitor dependent)
Trend data upload on restoration of WLAN connection		8 hours		8 hours
Maximum numerics trended	All	All	64	All
Beat labeling at the PIC iX	●	●		●
PIC iX enabled remote controls from the IntelliVue patient monitors			● (limited)	●
IntelliVue patient monitor remote controls from the PIC iX			● (limited)	●
Arrhythmia events available for trending in PIC iX	●	●		●
View and print reduced EASI 12-lead ECG lead report using the PIC iX	●	●	● (possible, depending on ECG wave availability)	●
View and print reduced Hexad 12-lead ECG lead report at PIC iX	●	●	●	●
Initiate diagnostic 12-lead reports from the PIC iX				●
Printing of PIC iX reports	●	●	●	●
Printing of IntelliVue patient monitor reports				●
ECG data transmission rate to PIC iX	125 sps	125 sps	250 sps	500 sps, for 12 lead full-disclosure option. Otherwise 250 sps.
ST and QT wave data are available for view at the PIC iX	●	●		●
Simultaneous alarms transmitted	7	7	7	Unlimited
Bed overview on IntelliVue patient monitors				●
Alarm status overview bar within IntelliVue patient monitors				●
Device location	●		●	
IntelliBridge parameters supported			up to 12 numerics for each EC10 driver	All

● = supported/applicable

Please note that the following apply to IntelliVue MX40 only:



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