Customer network requirements and recommendations

This document summarizes the hardware, software, and communication requirements, product specifications, and required and recommended settings for wireless customer network implementation.

- If minimum system requirements are not met, system performance will be impacted.
- Apply relevant software updates and patches.

Wireless server requirements

The information provided describes the requirements and recommendations for the hardware and software of the wireless server.

Hardware requirements	
Capacity	**Requirement**
1-300 connected products	2.x GHz processor or better with a total of 4 cores Memory: 8 GB RAM Hard drive: 150 GB
301-600 connected products	2.x GHz processor or better with a total of 8 cores Memory: 16 GB RAM Hard drive: 150 GB
601-800 connected products	2.x GHz processor or better with a total of 16 cores Memory: 32 GB RAM Hard drive: 150 GB
801-1,000 connected products	2.x GHz processor or better with a total of 24 cores Memory: 32 GB RAM Hard drive: 150 GB
1,001-1,300 connected products	2.x GHz processor or better with a total of 32 cores Memory: 64 GB RAM Hard drive: 150 GB
1,300+ connected products	For systems that have over 1,300 connected beds, add a core for every 50 additional beds.

Note
- Two server environments for the wireless servers are recommended - test and production.
- The wireless server is supported in either physical or virtual environments.

Software and setup requirements		
Scope	**Requirement**	**Requirement**
Operating system	Microsoft Windows server 2019	Microsoft Windows server 2022

Server roles	Add roles
	
	• Web server (IIS) (installed)
	• Roles services
	  ◦ Application development
	    – ASP.NET 3.5 (installed)
	    – ASP.NET 4.5 (or higher) (installed)
	    – ASP (installed)
	
	• Management tools
	  ◦ IIS management console (installed)
		Add roles
		
		• Web server (IIS) (installed)
		• Common HTTP features
		• Performance
		• Security
		  ◦ Application development
		    – .Net Extensibility 4.8
		    – ASP.NET 4.8
		    – ISAPI Extensions
		    – ISAPI Filters
		
		• Management tools
		  ◦ IIS management console (installed)

Software and setup requirements		
Scope	**Requirement**	**Requirement**

Server features	• .NET framework 3.5 features (installed)
	
	• .NET framework 4.5 (or higher) features (installed)
	
	• Telnet client
	
	   ◦ WCF services
	
	      – HTTP activation
		• .NET framework 4.8 features (installed)
		
		• .NET framework 4.8 (or higher) features (installed)
		
		• Telnet client
		
		   ◦ WCF services
		
		      – HTTP activation

Other	Update server for all current Microsoft priority updates and optional update .NET Framework 4.5	Update server for all current Microsoft priority updates and optional update .NET Framework 4.8

Security	
Scope	**Requirement**
Credentials	Administrator account on the server machine for installation and configuration
Remote access	Remote access to the wireless server (for example: VPN, Citrix, etc.)

Backup and disaster recovery plan
Stryker server backups or a disaster recovery plan are the responsibility of the customer.

Wireless client product data usage

Bandwidth used by the wireless system

- An average of 10-15 KB per connected product every forty seconds.

- An additional 15-40 KB per connected product for each subscription created by a third-party vendor[1].

- Product messages are sent between zero seconds to five minutes while connected. This depends on the product activity (brakes applied, rails adjusted, alarms, etc.) and how the third-party defined the subscription times.

[1]Example of third-party vendor connected products.	
Non-Stryker	**Stryker**
Connexall	Vision
Capsule	SEM
Epic	Engage
Cerner	

Stryker products Prime Connect (1105, 1115, and 1125), ProCuity (3009), S3 (3005) field upgraded, and Power-PRO 2 (6507 wireless client radio (GW4.x) specifications

The following table describes the specifications for the Stryker wireless client radio products.

Manufacturer/model	Silex SX-SDMAC-2832S+
Chipset	QCA9377-3
IEEE 802.11	a/b/g/n/ac
RF bands	2.4 GHz, 5 GHz
Encryption	AES and TKIP **Note** - TKIP is not supported with WPA2.
Authentication	WPA Personal/Enterprise and WPA2 Personal/Enterprise
802.1X	PEAP-MSCHAP v2
Client certificates	Cannot accept or upload certificates
Supported data rates	IEEE 802.11b: 1-11 Mbps IEEE 802.11a/g: 6-54 Mbps IEEE 802.11n: MCS 0-7 (1x1) IEEE 802.11ac: MCS 0-9 (1x1)
Hash function compatibility	SHA-1 and SHA-2 server-side certificate recognition for PEAP-MSCHAP v2
Channel plan	2.4 GHz: All channels supported 5 GHz: All channels supported **Note** - Stryker recommends against the use of DFS and ISM channels.
Other	Leverage hospital SSID Supports fast roaming (802.11r and CCKM)

Item	Specification - Chipset QCA9377-3				Unit
	Band	**Mode**	**Min**	**Max**	
Operating frequencies	2.4GHz	11b	2412	2472	MHz
		11g/n/ac 20 MHz	2412	2472	MHz
	5GHz	11a/n/ac 20MHz	5180	5825	MHz
		11n/ac 40MHz	5190	5795	MHz
Frequency steps	2.4GHz	11b/g/n/ac 20MHz	5		MHz
	5GHz	11a/n/ac 20MHz	20		MHz
		11n/ac 40MHz	40		MHz
Modulation types	Not applicable	11b	DSSS (DBPSK, DQPSK, CCK)		Not applicable
	Not applicable	11a/g/n	OFDM (BPSK, QPSK, 16QAM, 64QAM)		Not applicable
	Not applicable	11ac	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)		Not applicable
Maximum ERP	Not applicable	Not applicable	-8.648/21.352		dBW/dBm

Stryker product 3005 S3 wireless client radio (GW2) specifications

The following table describes the specifications for the Stryker wireless client radio products.

iBed wireless client radio specifications

Manufacturer model	Silex SX-SDMAN-2830S
Chipset	AR6233X
IEEE 802.11	a/b/g/n
RF bands	2.4 GHz, 5 GHz
Encryption	AES and TKIP **Note** - TKIP is not supported with WPA2
Authentication	WPA Personal/Enterprise and WPA2 Personal/Enterprise
802.1X	PEAP-MSCHAPv2
Client certificates	Cannot accept or upload certificates
Supported data rates	802.11b/g: 1-54 Mbps 802.11a: 6-54 Mbps 802.11n: MCS 0-6
Channel plan	2.4 GHz: All Channels Supported 5 GHz: All Channels Supported **Note** - Recommend against using DFS and ISM Channels
Other	Leverage hospital SSID

Stryker product InTouch Critical Care Bed (2141) wireless client radio (GW3) specifications

The following table describes the specifications for the Stryker wireless client radio products.

Manufacturer model	Silex SX-SDMAC-2831S
Chipset	QCA9377
IEEE 802.11	a/b/g/n/ac
RF bands	2.4 GHz, 5 GHz
Encryption	AES and TKIP **Note** - TKIP is not supported with WPA2
Authentication	WPA Personal/Enterprise and WPA2 Personal/Enterprise
802.1X	PEAP-MSCHAPv2
Client certificates	Cannot accept or upload certificates
Supported data rates	IEEE 802.11b/g: 1-54 Mbps IEEE 802.11a: 6-54 Mbps IEEE 802.11n: MCS 0-7 IEEE 802.11ac: Compatible ONLY
Hash function compatibility	SHA-1 and SHA-2 server side certificate recognition for PEAP-MSCHAPv2
Channel plan	2.4 GHz: All channels supported 5 GHz: All channels supported **Note** - Stryker recommends against the use of DFS and ISM channels.
Other	Leverage hospital SSID

Customer network communication requirements

LAN environment		
Client/server communication	IP v4 only	Not applicable
Client device IP allocation	Static	If static, a unique IP address is required for each client MAC address
	DHCP	• If DHCP and not using a DNS name - a reserved IP address is required for each client MAC address for client management • If DHCP and using a DNS name - a unique name is required for each client MAC address for client management ◦ Stryker recommends that you use the Stryker client host name when the Stryker device connects to the wireless network - for example: SYK-00197b12365 may look like http://SYK-00197b12365.hosp.org
Server IP allocation	Static IP required	Not applicable
VLAN	New, existing	Stryker recommends that the wireless radio server is installed on a separate VLAN.

IP traffic environment		
Source	**Protocol/port number**	**Destination**
iBed server	TCP/21	Stryker wireless radio client
iBed server	TCP/80/443	Third party/Stryker back office
iBed server	TCP/1639	Stryker wireless radio client
iBed server application	Defined by third party	Third party
Third party/Stryker wireless radio client	TCP/80/1639/443	**iBed** server

Customer WLAN environment		
Professional site survey	Data grade site survey	Recommended
Channel width	2.4 GHz: 20 MHz 5 GHz: 20 MHz (recommended) or 40 MHz	Required
Channel utilization	Consistently less than 30% before the installation of Stryker wireless products	Recommended
Coverage	-70 dBm minimum	Required
	-67 dBm minimum	Recommended
Minimum SNR	20 dB	Required
	25 dB	Recommended
Client exclusion	Disabled	Recommended
Client load balancing	Disabled	Recommended
Max number of SSIDs	5	Recommended
Authentication timeout	Add session timeout of at least 24 hours	Recommended
Beacon interval	100 ms	Required
Access points (AP) on overlapping channels	≤3@≥-80 dBM	Recommended

Note

- Co-channel interference occurs when proper isolation is not attained. Stryker recommends the use of a 20 MHz channel width.
- Sufficient signal strength alleviates channel use load as higher data rates are selected with high SNR levels (and higher signal strength) that take up less airtime. Less airtime per transmission translates to lower channel use.

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