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I. Introduction

The purpose of this White Paper is to provide a high-level technical overview of the InSight Solution.

Insight is a multi-tier application designed to support the delivery of Managed Office Print Services. It supports service delivery processes that enable End User customers or outsource Service Providers to deliver highly automated Asset management, Consumables supply chain management, Incident service chain management, billing reconciliation, active service delivery, as well as management information reporting.

Insight comprises three components as illustrated below.

- Insight Portal Server- For centralized remote service delivery across multiple customers. Installed as a private or multi-tenanted Cloud service for processing all information received from the Data Collection Applications (Monitoring application)
- Data Collection Application- Small footprint service installed on the customer network to collect information and report the information back to a Portal server.
- Messaging Server- Delivered as part of the Portal infrastructure and used to pass encrypted XML data securely from the Insight Monitoring application to the Insight Portal Server and authorized service administrators. This is a 'hidden' component and seamlessly integrated onto the Portal structure.

In addition, a natural language command system is available to allow remote management, diagnostics, and support for all Insight monitoring systems. This language is called IMIL. This enables remote configuration of the DCA without VPN access.

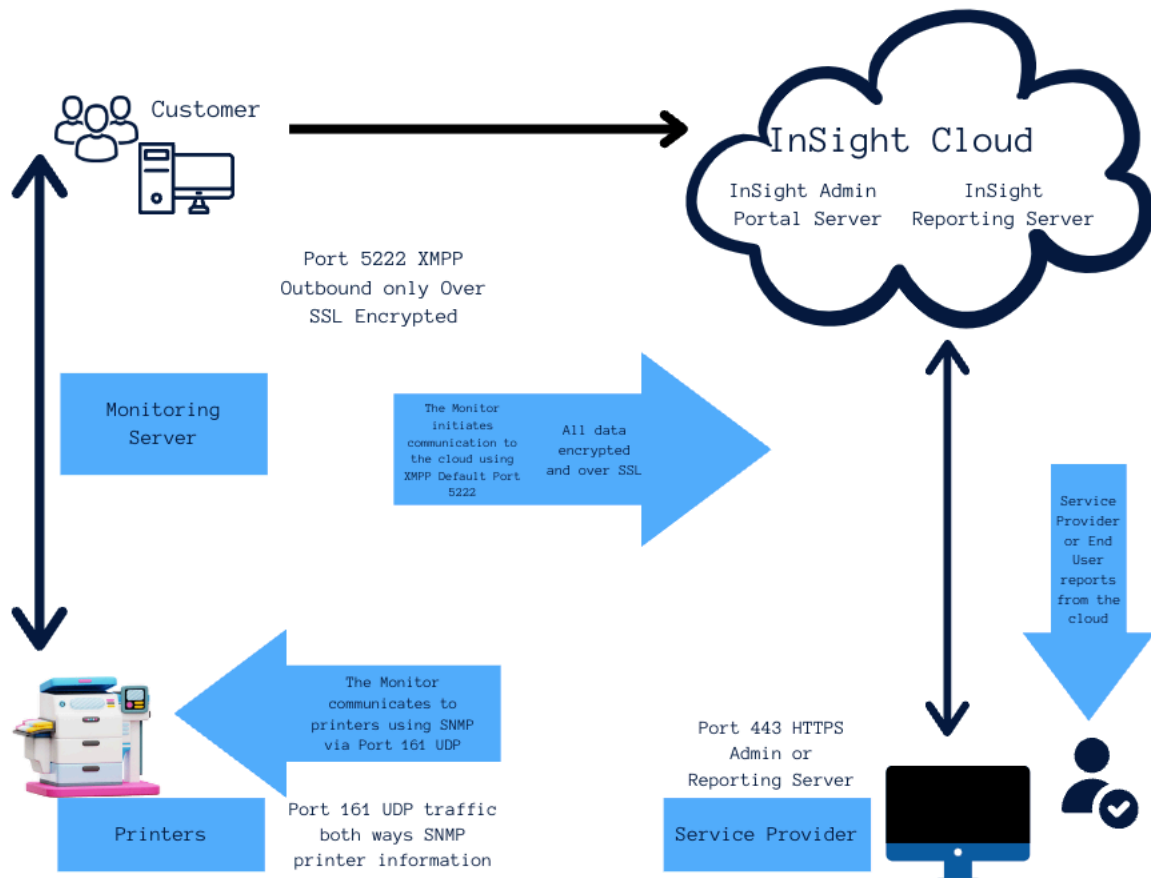
Insight monitoring applications discover and monitor network devices using SNMP UDP over port 161, they do not Ping, multicast, or broadcast.

Working data is stored in an internal administration database for local processing before transmission to the Insight portal.

Management of the Insight Portal is provided through a web interface running over HTTPS. See figure 1.

The Management requirement of the monitoring server is minimal and can be achieved remotely via the Portal Server should this be required. Service Management is delivered from the Insight Portal. Further Monitoring or device diagnostic information can be captured via the IMIL™ interface.

Fig. 1 Typical remote service system diagram.



The Management requirement of the monitoring server is minimal and can be achieved remotely via the Portal Server should this be required. Service Management is delivered from the Insight Portal. Further Monitoring or device diagnostic information can be captured via the IMIL™ interface.

Data is transmitted to the Insight Portal via the internet using XMPP, by default over port 5222 TCP. Alternative ports can be used such as port 443 and the Monitoring Application (DCA) will automatically select the port which is available. All data is encrypted and sent via SSL. All communication is initiated by the customer monitoring application. All communication is outbound only.

The Insight Portal processes this information and enables print service delivery managing the core functions of Asset Management, Consumable supply chain management and Service chain management. Where required, integration with the Service Provider's Service Management or ERP Systems can be implemented. Service Management systems typically provide help desk, engineer scheduling, further asset management, stock control, procurement and invoicing systems to which Insight can feed highly qualified structured data for further processing.

Local support and notifications to end user contacts or to contacts in the service or supply chains can be provided via email to defined multiple destinations.

Please note access to IMIL allows a remote user to restart the DCA service or initiate the auto-update to perform a version upgrade. The endpoint **updates.ekmglobal.com** may need to be whitelisted in your Web Proxy/Firewall to allow this. It is possible to block access to **updates.ekmglobal.com** within the firewall to prevent the auto-update process from working. The user account associated with the Windows service can also be changed to a lower, or a non-system privileges account to effectively limit any risk of the DCA affecting the host computer.

II. Device Import and Discovery

Discovery of network print devices is done using defined IP address ranges or via point discoveries for devices at known locations.

Lists can be created offline or exported from other systems imported into Insight Portal which will be read by the monitoring application the next time it communicates to the portal.

If an HP JAMC is installed, then the device IP will be transmitted to the JAMC automatically for inclusion into the JAMC monitoring.

Once a device has been discovered for the first time, added to the Asset List and registered for management InSight monitoring application will begin to monitor the device.

III. Moves and Changes

The discovery process is designed to support the critical function of active moves and change management providing notifications of change events if required. It is also designed to create minimal network traffic through targeting specific device information only.

Discoveries run at regular intervals to identify changes to the fleet e.g., new, moved or changed devices.

In addition, the monitoring loops will also track any IP address changes, Serial and MAC address changes and change of monitoring application name.

IV. Network Print and Device Monitoring

Network device monitoring uses the SNMP protocol on port 161 using UDP for most printing equipment. The Insight application supports SNMP V1, V2 & V3. SNMP V2 provides the best performance together with minimal network traffic. The extra security requirement of SNMP V3 creates extra performance and administration overheads so should be avoided unless the additional security is necessary.

The monitoring process comprises five independent sub-processes that scan devices to confirm they are available, collect alerts, record consumable levels, record media status and record page counts. Device Monitoring is self- optimizing with each sub-process only reading the specific information it needs to perform its specific task thereby minimizing network traffic and maximizing the number of actively monitored devices per server. For very large fleets multiple monitoring applications can be deployed or the network segmented with the data consolidated at a Portal Server.

All data items are checked for validity before being stored in the database. Data that is inconsistent with previous readings and usage trends is rejected then collected during the next monitoring cycle.

The timing of the sub-processes is optimized such that information that is less time critical e.g., page counts is retrieved less frequently than time critical information e.g., device alert status.

Most of the information used by Insight is retrieved from the standard Printer MIB (RFC 1759). In addition, information is also retrieved from the Manufacturer’s Private MIB or other sources where required for effective service management.

V. Information Collection

The information collected during active service management falls into three main categories:

- Asset information, including meter usage information
- Consumables Supply chain information
- Incident Service Chain information

The Insight Monitoring applications do not collect any user identifiable information from the network print devices. Although many print devices do record job information, Insight does not retrieve this information.

The Insight monitoring server sends four key types of information back to the Insight Portal Server:

- Asset information - manufacturer, model, location, device identification

Customer	Device ID	zone	Manufacturer	Model	Serial Number	Asset Number	MAC Address	IP Address	Engine Cycles	Uncovery Date	Device Location	HP-Data Status	SELECT
Local Test2	1	Boise_HQ_Floor1	HP	PageWide Pro MFP 4775w *	046404000P	?				189	05-Feb-2019 16:43:31	Genuine HP consumables	<input type="checkbox"/>
Local Test2	1	Boise_HQ_Floor1	Samsung	CLX-6330ND	14848DQ400027E	ID 1234	001599100E85	192.168.1.80	8690	30-Mar-2017 16:30:35	Not an HP device	<input type="checkbox"/>	
Local Test2	2	London	Kyocera	ECOSYS M5025cds *	LVC4706697	1234ABC	00C0E3F8CDD	192.168.1.88	15204	30-Mar-2017 16:30:38	Not an HP device	<input type="checkbox"/>	
Local Test2	3	London	Samsung	CLP-600N *	3KQ258BL20003Y	Equipment Number	001599012784	Unknown	2228	30-Mar-2017 16:30:46	Not an HP device	<input type="checkbox"/>	
Local Test2	4	London	Kyocera	FS-6950 DN *	X3M6800746	Equipment Number	00C0E893009	192.168.1.103	19107	30-Mar-2017 16:30:51	Not an HP device	<input type="checkbox"/>	
Local Test2	6	192.168.11-254	Lexmark	Optra T 64x N *	4FF40E	Equipment Number	000400C9198	192.168.1.102	138464	30-Mar-2017 16:31:00	Not an HP device	<input type="checkbox"/>	
Local Test2	7	192.168.11-254	HP	OfficeJet 720 All in one *	M156TC02W0406	Equipment Number	00009023BC3F	Unknown	2283	30-Mar-2017 16:31:02	Unknown	<input type="checkbox"/>	
Local Test2	8	Bristol	HP	Color LaserJet Managed Flow MFP M577cm *	0464H8558	Houston001	308D59AF886A	192.168.1.95	5719	30-Mar-2017 16:53:00	Carlow	Genuine HP consumables	<input type="checkbox"/>
Local Test2	9	192.168.11-254	HP	LaserJet Enterprise 700 color MFP M772a *	M00000519	Equipment Number	6C8E50A488F	192.168.1.118	4355	15-Aug-2017 13:10:58		Genuine HP consumables	<input type="checkbox"/>
Local Test2	10	192.168.11-254	Epson	WorkForce Pro WF-5100DN *	50Y0000025	Equipment Number	AC182E3A8372	Unknown	1073	28-Nov-2017 14:58:36		Not an HP device	<input type="checkbox"/>
Local Test2	11	192.168.11-254	HP	PageWide Enterprise Color Flow MFP 782F *	MX300025Y	Equipment Number	F430B96F3213	192.168.1.115	132	10-Apr-2018 14:34:10		Genuine HP consumables	<input type="checkbox"/>
Local Test2	12	192.168.11-254	Samsung	CLP-600N	4328K9P800006A	?	0015993FFA20	192.168.1.86	10067	05-Jun-2018 14:58:53		Not an HP device	<input type="checkbox"/>

- Usage Information - page counts recorded by the print device both in summary and in detail

Device Details

Device ID	11
Discovery Date	10-Apr-2019 14:34:10
Serial Number	M93CK731Y
IP Address	192.168.1.119
Hostname	NP1RF97G3
MAC Address	F430B969213
Asset Number	Equipment Number
Sticker Number	Model Number
Manufacturer	HP
Model	PageWide Enterprise Color Flow MFP 785F (Auto-act)
SKU	J721A
MB Description	HP PageWide Color Flow MFP 785
Monitor Status	Fully enabled (managed consumables)
Zone	192.168.1.1254
Delivery Location	As per zone
Consumable Key User	As per zone
Comment	

Custom Data

IsActiveDate	
Device Location	
Device Notes	
HP Contract End	02-May-2019
Meter ID 1	
Meter ID 2	
Color Cost Per Page	0.035
Colour Target Volume	
Mono Cost Per Page	
Mono Target Volume	
Monthly lease/rental	
Quarterly lease/rental	
Request Threshold Override	

Latest Page Counts

Mono Small	75
Colour Small	49
Total Small	123
Mono Large	0
Colour Large	9
Total Large	9
Mono (A4-equivalent)	75
Colour (A4-equivalent)	66
Total (A4-equivalent)	141
Mono Pages	75
Colour Pages	57
Total Pages	132
Engine Cycles	123
Last Updated	19-Jul-2020 02:09:09

Current Alerts

There are no current alerts for this device.

Latest Page Counts

Mono Small	75
Colour Small	49
Total Small	123
Mono Large	0
Colour Large	9
Total Large	9
Mono (A4-equivalent)	75
Colour (A4-equivalent)	66
Total (A4-equivalent)	141
Mono Pages	75
Colour Pages	57
Total Pages	132
Engine Cycles	123
Last Updated	19-Jul-2020 02:09:09

Monthly Usage History

Bar chart showing usage for Jul 2018, Aug 2018, Nov 2018, and Jan 2019. Legend: Mono (A4-equivalent), Colour (A4-equivalent).

Usage Summary (A4-equivalent)

Mono	0	0	0
Colour	0	0	0
Total	0	0	0
Last 7 Days	0	0	0
Daily Average	0	0	0
This Calendar Month (to date)	0	0	0
Last Calendar Month	0	0	0

Historical Alerts

Date	Engine Cycles	Alert Class	Severity	Training	Reason	Cleared	Duration	Creates Incident
19-Jul-2020 14:19:30	89,066	System Warning (EJAM)	Warning	Untested	020-076 The machine has scanned the current original and is now waiting for the next original to scan. User intervention is required to load the next original in order to continue the current scan operation. Printing may be stopped.	19-Jul-2020 14:22:43	3m 13s	[X]
19-Jul-2020 14:19:30	89,066	jam	Critical	Untested	071-103 A paper jam has been detected near the Paper and Print Cover. User intervention is required to clear paper jam (instructions provided at the US). Printing has stopped.			[X]
19-Jul-2020 09:16:19		Availability	[Not set]	[Not set]	Monitoring resumed: This device is now responding	19-Jul-2020 09:19:03	3m 2s	[X]
19-Jul-2020 16:44:01		Availability	[Not set]	[Not set]	Device busy/unavailable for over 24 hours (total@24 hrs)	19-Jul-2020 09:19:03	1d 18h	[X]
19-Jul-2020 16:32:30	89,066	jam	Critical	Untested	071-300 A paper jam has been detected within the Left Cover area of the machine. User intervention is required to clear paper jam condition (instructions provided at the US). Printing has stopped.	19-Jul-2020 16:33:30	3d 3h	[X]
19-Jul-2020 16:32:30	89,066	jam	Critical	Untested	071-301 A paper jam has been detected near the Horizontal Transport and Left Cover areas of the machine. User intervention is required to clear paper jam condition (instructions provided at the US). Printing has stopped.	19-Jul-2020 09:13:55	2d 22h	[X]
09-Jul-2020 10:16:18	89,066	System Fail	Critical	Field Service	010-027 The machine has detected a fault with the Fuser. User intervention is required to turn the machine power off and on. Field Service is required if the problem persists. Printing is disabled.	19-Jul-2020 10:17:50	1d 23h	[X]

- Incident Service chain Management and alert information – alerts reported by the print device

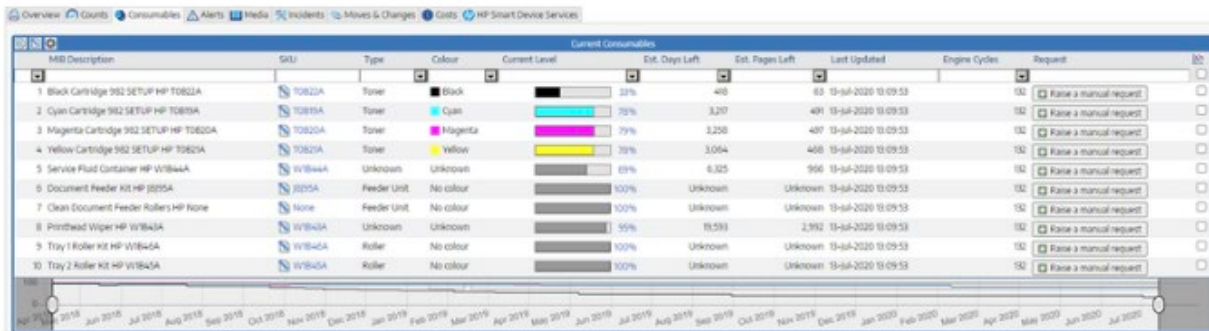
Current Alerts

Date	Engine Cycles	Alert Class	Severity	Training	Reason
19-Jul-2020 14:19:30	89,066	System Warning (EJAM)	Warning	Untested	020-076 The machine has scanned the current original and is now waiting for the next original to scan. User intervention is required to load the next original in order to continue the current scan operation. Printing may be stopped.
09-Jul-2020 10:49:39	89,066	Media Out	Warning (State)	Untested	075-401 Tray 5 is empty. User intervention is required to add paper to Tray 5. Printing can continue.

Historical Alerts

Date	Engine Cycles	Alert Class	Severity	Training	Reason	Cleared	Duration	Creates Incident
19-Jul-2020 14:19:30	89,066	System Warning (EJAM)	Warning	Untested	020-076 The machine has scanned the current original and is now waiting for the next original to scan. User intervention is required to load the next original in order to continue the current scan operation. Printing may be stopped.	19-Jul-2020 14:22:43	3m 13s	[X]
19-Jul-2020 14:19:30	89,066	jam	Critical	Untested	071-103 A paper jam has been detected near the Paper and Print Cover. User intervention is required to clear paper jam (instructions provided at the US). Printing has stopped.			[X]
19-Jul-2020 09:16:19		Availability	[Not set]	[Not set]	Monitoring resumed: This device is now responding	19-Jul-2020 09:19:03	3m 2s	[X]
19-Jul-2020 16:44:01		Availability	[Not set]	[Not set]	Device busy/unavailable for over 24 hours (total@24 hrs)	19-Jul-2020 09:19:03	1d 18h	[X]
19-Jul-2020 16:32:30	89,066	jam	Critical	Untested	071-300 A paper jam has been detected within the Left Cover area of the machine. User intervention is required to clear paper jam condition (instructions provided at the US). Printing has stopped.	19-Jul-2020 16:33:30	3d 3h	[X]
19-Jul-2020 16:32:30	89,066	jam	Critical	Untested	071-301 A paper jam has been detected near the Horizontal Transport and Left Cover areas of the machine. User intervention is required to clear paper jam condition (instructions provided at the US). Printing has stopped.	19-Jul-2020 09:13:55	2d 22h	[X]
09-Jul-2020 10:16:18	89,066	System Fail	Critical	Field Service	010-027 The machine has detected a fault with the Fuser. User intervention is required to turn the machine power off and on. Field Service is required if the problem persists. Printing is disabled.	19-Jul-2020 10:17:50	1d 23h	[X]

- Consumable supply chain information - consumable levels reported by the print device.



MB Description	S&U	Type	Colour	Current Level	Est. Days Left	Est. Pages Left	Last Updated	Engine Cycles	Request
1 Black Cartridge 962 SETUP HP T0822A	T0822A	Toner	Black	23%	418	63	19-Jul-2020 10:09:53	150	Raise a manual request
2 Cyan Cartridge 962 SETUP HP T0819A	T0819A	Toner	Cyan	75%	3,217	491	19-Jul-2020 10:09:53	150	Raise a manual request
3 Magenta Cartridge 962 SETUP HP T0820A	T0820A	Toner	Magenta	79%	3,258	487	19-Jul-2020 10:09:53	150	Raise a manual request
4 Yellow Cartridge 962 SETUP HP T0821A	T0821A	Toner	Yellow	79%	3,064	468	19-Jul-2020 10:09:53	150	Raise a manual request
5 Service Fluid Container HP W1844A	W1844A	Unknown	Unknown	89%	6,325	956	19-Jul-2020 10:09:53	150	Raise a manual request
6 Document Feeder Kit HP J0254A	J0254A	Feeder Unit	No colour	100%	Unknown	Unknown	19-Jul-2020 10:09:53	150	Raise a manual request
7 Clean Document Feeder Rollers HP None	None	Feeder Unit	No colour	100%	Unknown	Unknown	19-Jul-2020 10:09:53	150	Raise a manual request
8 Pinhead Wiper HP W1843A	W1843A	Unknown	Unknown	95%	15,593	2,942	19-Jul-2020 10:09:53	150	Raise a manual request
9 Tray 1 Roller Kit HP W1845A	W1845A	Roller	No colour	100%	Unknown	Unknown	19-Jul-2020 10:09:53	150	Raise a manual request
10 Tray 2 Roller Kit HP W1845A	W1845A	Roller	No colour	100%	Unknown	Unknown	19-Jul-2020 10:09:53	150	Raise a manual request

This information is carefully analyzed in real-time to generate service management messages and route them to the appropriate destination for action enabling very large fleets to be managed highly effectively by exception.

VI. Number of Devices Supported

The number of devices that can be monitored by a single Insight monitoring Server depends on a variety of factors including network speed, age and complexity of the printer fleet, DNS efficiency, the longest allowable alert response time, the processor speed, and memory capacity of the actual Insight Enterprise or Monitoring Servers. It is therefore not possible to provide a definitive answer. As a guide, typically one Monitoring Server can handle between 1 and 5,000 physical devices. If there are more devices to be monitored multiple Insight monitoring applications can be deployed.

There is no limit on the number of devices supported at the Portal server.

VII. Insight Monitor (DCA) / Server Hardware and Operating System Specifications

The Insight Monitoring Server can be installed on most typical Windows PC/Server/VM platforms.

However, for live service operation with more than 250 devices we would recommend a server operating system as this will provide a more reliable service. As the system does continuous quality of service monitoring, we further recommend that the server is operating continuously and is not switched off.

It is not recommended to use laptops if possible due to the transient nature of these devices.

VIII. Virtual Machines

Deploying on virtual machines is fully supported. Insight is a real-time monitoring application however and this must be considered.

The Insight Monitoring Server use very little system resources but do require constant access to the LAN card to perform monitoring of the fleet, VMs needs to be configured to support this method of operation to optimize performance.

IX. Data and Traffic Network

The SNMP network traffic generated by the Insight application is generally less than 10Kbits per second.

For device management devices generate approximately 1 Kbyte per device per day. Alternatively, this can be viewed as 25 devices creating the same data as a single A4 text only page sent to print. It is not recommended to use laptops if possible due to the transient nature of these devices.

X. Network Ports

InSight uses the following TCP/IP ports:

Customer Network:

PROTOCOL	PORT (DEFAULT)	FUNCTION
SNMP	Port 161 UDP	Device Monitoring
HTTPs (SSL/TLS)	Port 443 TCP	Access to Insight web interface and device web pages/ Product updates https://updates.ekmglobal.com
HTTP	Port 80	Device monitoring where done via device web services
SMTP	Port 25 TCP	Internal Customer email communications e.g., email alerts to Customer Helpdesk
HP JAMC	443/Various	Please see detailed HP JAMC specification for detailed information

Communication to Service Provider:

PROTOCOL	PORT (DEFAULT)	FUNCTION
XMPP	Port 5222 TCP (others can be used if they allow encrypted XML traffic e.g., 443)	Operational Data communication to Service Provider
HTTPS	443	License verification- DCA V28 ONWARDS
HTTP	Port 80	Licence verification- LEGACY DCA'S ONLY.
VPN	Customer Specific	Remote access to InSight server where needed
HP JAMC	Port 25 TCP	Please see detailed HP JAMC specification for detailed information

XI. External Firewall Rules

Outbound Management Data

For outbound traffic to the Portal Server the monitoring application must be able to initiate a session with the InSight portal via XMPP IANA defined port for this encrypted XML traffic. This is Port 5222.

Once initiated the session must allow two-way communications.

Please contact your Service Provider should you wish to use an alternative port, however Port 5222 is the most secure and highly recommended port to use. Please contact your Service Provider for the URL of the Portal server for “whitelisting” should this be required.

License Verification

Periodically the monitoring server contacts the or service provider license server via port 80. Please contact your Service Provider for the URL of the Portal server for “whitelisting” should this be required.

If port 80 is unavailable, please contact support and a license file (.lic) can be provided.

Version: 4.9