Technical White Paper.
Network Guidelines for Prinect Production Manager.

Networking.
A critical part of performance.

Networking is a fundamental element of any computer system and that includes Heidelberg Prinect® Workflow systems. When you talk about the performance of your workflow, Network I/O is a critical part of that discussion. Just like with Disk I/O, printers face a unique challenge. Traditionally, businesses have to deal with either small files or large files, but printers face the unique challenge of having to deal with both small files (office documents, spreadsheets, email, etc.) and very large files (like 1-bit TIFF and high-resolution, 4-color imposed PDF). This changes the dynamic of how you optimize the Network I/O. Since Prinect is Network I/O intensive, having a reliable, well performing network is an important foundation for successful installation and production. This document provides some general guidelines and technical details on the necessary requirements.

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General

When it comes to Heidelberg Prinect Production Manager, all devices (Client Workstations, Proofers, Servers, etc.) that will be used in the Workflow need to adhere to the following guidelines:

- All workflow components connect at GbE or higher.
- All workflow components connect to the same physical Switch and same logical Subnet and VLAN.
- All workflow components use the same NTP (Network Time Protocol) Server.
- All workflow components are joined to the same Domain or the same Workgroup.
    › No mixed Domain/Workgroup Support
- All workflow components use the same Subnet Mask, Gateway IP Address and DNS Servers (Primary & Alternate).
    › DNS should be Private (internal to LAN) not Public (on the Internet).
- All workflow components are configured using static IP Addresses or with a permanent reservations on a DHCP Server.
- No VOIP (Voice Over IP) where a workflow component is connected to the network through an IP Phone.
- Where possible, update the NIC Drivers/Firmware on any devices that you will be using.
- Everything is well documented!

Network Switch

- Network Switches are available as Unmanaged, Web Managed and Fully Managed. All will work with the Workflow. Heidelberg recommends using a Web Managed or Fully Managed Switch. Managed Switches have a Web-based User Interface, and/or a CLI (Command Line Interface) that allows you to access the Switch and view configuration, logs and statistics, which are helpful for optimizing, securing and troubleshooting the Switch.

- Network Switches are available as Layer 2 and as Layer 3. Either will work with the Heidelberg Prinect Workflow. A Layer 2 Switch will be cheaper and less complicated to configure than a Layer 3 Switch. Unless you need the features provided, you probably do not need to invest in a Layer 3 Switch.

- Network Switches are available different with Port Densities, e.g., 8-port, 12-port, 24-port and 48-port. Heidelberg recommends getting a Switch with a higher port density than you need. The price of the Switch may be more, but the price per port is cheaper and allows for easy growth. When you maximize port density, you have to either replace the Switch or daisy-chain multiple Switches, which create bottlenecks that can affect performance in the Workflow.

- Heidelberg recommends customers purchase a commercial grade Switch intended for businesses and not one intended for home use. Heidelberg does not recommend a specific vendor or product; however, customers have had success with vendors like Dell®, Cisco®, HP and NetGear®.

- The Servers come with built-in 10-GbE, but in order to use rated speeds, the Switch must also support 10-GbE (in particular 10G-BaseT – twisted pair cable – or else you have to convert to SFP+ which is Fiber). When purchasing a Switch, if you want to eventually migrate to 10-GbE, you need to purchase a Switch with that capability built-in or that allows modules to be added. Connecting 10-GbE servers to 10-GbE ports on 1-GbE switches might cause you some oversubscription issues that you will need to control with port throttling/flow-control. A 1-GbE device will "whisper" to a 10-GbE device all day long; however, the oversubscription arises when the 10-GbE responds with a "shout." The 10-GbE device needs to tell the 1-GbE devices to "stop talking" while it's communicating with the 1-GbE. When the 1-GbE's buffer becomes full, it tells the 10-GbE device to stop talking until its packet buffer drains sufficiently to accept more data. For that reason, we recommend using a true 10-GbE Switch for 10-GbE networking.

- When installing a new Switch, the first thing you should do is update the firmware to the latest version. Keep in mind that often "new" Switches have actually sat on the shelf in a distributor's warehouse and when purchased they still have older firmware installed. In addition, you should secure the Switch with a password and other security settings.
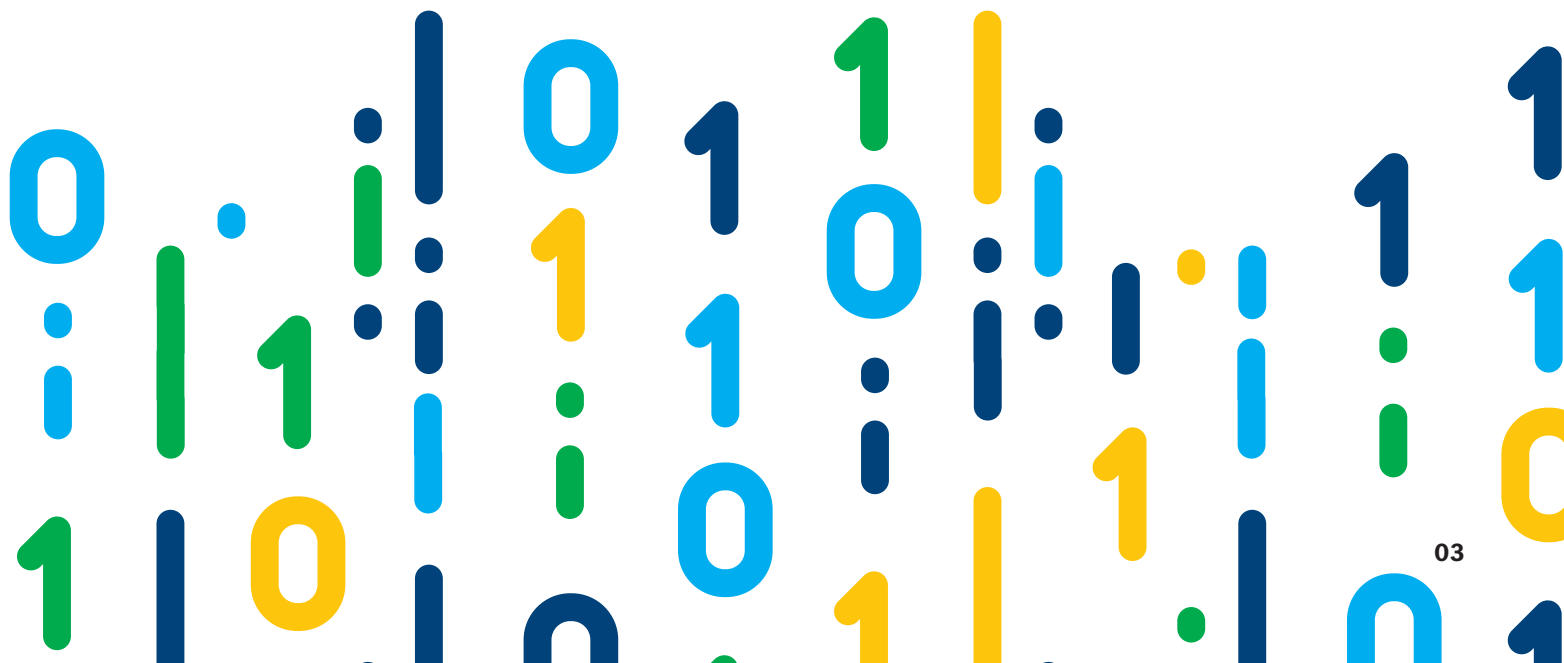
# Video Support and
Remote Training:

Heidelberg recommends customers purchase a commercial grade Firewall intended for businesses and not one intended for home use. Heidelberg does not recommend a specific vendor or product; however, customers have had success with vendors like SonicWall® (TZ or NSA), WatchGuard® or Cisco ASA.

- The Firewall should support a DMZ.
- Firewall rules must permit the following URL's, ports and IP Addresses for the Prinect Maintenance Center:
  › https://software-center.pmc-gateway.heidelber.cloud
  › https://trust-service.pmc-gateway.heidelberg.cloud
  › https://kpi.pmg-gateway.heidelberg.cloud
  › https://software.heidelberg.com
  › https://onlinehelp.prinect-lounge.com
  › http://www.heidelberg.com:80
  › https://www.heidelberg.com:443

IP Addresses: 18.202.69.55
108.128.83.94
108.128.47.34
143.204.154.92
194.31.235.82

Ports required open between Client/Server & Server/Server:

TCP 1029	TCP 15010 through 15020
TCP 1511	TCP 31401 through 31411
TCP 3497 through 3498	TCP 32780 through 32799
TCP 4793 through 4795	TCP 33332
TCP 6088 through 6094	TCP 38801 through 38810
TCP 6311 through 6371	TCP 47101
TCP 6391 through 6399	TCP 49153 through 49299
TCP 6411 through 6416	TCP 50005 through 50007
TCP 6431 through 6469	TCP 50026
TCP 6630	TCP 50200 through 50299
TCP 7444 through 7450	TCP 50501 through 50601
TCP 8006	TCP 52000 through 52003
TCP 8090	TCP 52150 through 52351
TCP 8889	TCP 53350 through 53359
TCP 9458	TCP 52350 through 52351
TCP 9881 through 9882	TCP 65050, 65060, 65062, 65065 and 65100
TCP 10000 through 14095	
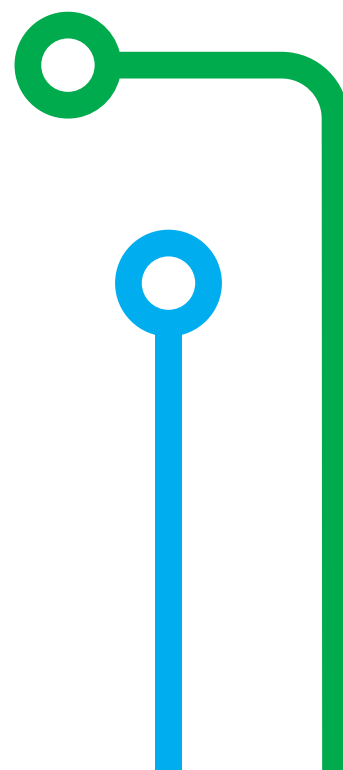
And for the following for the Press (some variation based on Press you have, software version running, options):

506	TCP
4000 – 10783	TCP
19558	TCP
49500	TCP
49700-49711	TCP
50001-50005	TCP
63001-63005	TCP

You also need the following Windows® Services:

NTP Time Service	123	TCP
SMB/CIFS	137	TCP
SMB/CIFS	139	TCP
HTTP	80	TCP
HTTPS	443	TCP

You will need the following port open to the Internet for our Remote Service/Support using TeamViewer:
5938 TCP

Please refer to the following URL for requirements recommended for our Remote Training:
https://support.goto.com/meeting/help/optimal-firewall-configuration-g2m060010

Please refer to the following URL for requirements recommended for our Video Support:
https://support.sightcall.com/hc/en-us/articles/202302326-Network-Requirements

To ensure proper access to Heilinx Remote Platform, the following communication must be possible:

Once during installation:
- Domain: cfg.iot.connectprint.cloud
- Port: 443

Continuously:
- Domain: mqtt.iot.connectprint.cloud
- Port: 443

Proxy settings:
- No certificate interception, set up exceptions if applicable

Name Resolution

Heidelberg Prinect Production Manager uses native JDF communication, and hostname resolution is a critical component.

Once defined, the hostname cannot be changed. It is embedded in many binary and ASCII files throughout the system.

If you do not have an internal DNS Server, hosts files must be used to map hostnames to IP Addresses.

Email Notification

Several components of Heidelberg Prinect Production Manager utilize email to notify administrators and Print Buyers of warnings, status and information. This includes the Prinect Maintenance Center and Prinect Portal. You will need the following information available for a successful installation:

Item	Property
SMTP Hostname	
Connection Security	
Port	
Authentication Method	
SMTP Username	
SMTP Password	
Maintenance Email Address	
Workflow "Reply To" Email	

Network Time Service

Time is a critical component of Prinect Production Manager. All devices used in the Workflow should synchronize to the same NTP Server.

Domain/Workgroup

Heidelberg Prinect Production Manager can run on a Domain or in a Workgroup. We do not, however, support mixed environments. While a device in a Microsoft Active Directory Domain can access resources outside of the domain (providing they have access rights to it), the non-domain device would not be able to authenticate to the domain and would need to be a member of the domain to connect to the domain's resources. In addition, there is no automated updating or control over policies and password aging, so if an account's password changes, it can break the workflow.

What affects your network performance?

- **Network Latency:** Latency is a time delay in the transmission of data. Latency can be caused by many variables such as the number of hops data packets must traverse. A "hop" is every network device that the packet passes through including switches, routers, bridges, firewalls, gateways, etc.

- **Bandwidth:** Bandwidth is not really the speed of your network but the maximum amount of "bits per second" (for the most part, it is specified in "megabits per second" or "gigabits per second" in today's world) that can be transferred over the network at any time.

- **Congestion:** Applications, such as video streaming, that consume large amounts of bandwidth can create network congestion. Network congestion can cause packet loss or retransmission, blocked new connections, and/or various delays. Congestion occurs when the number of packets being transmitted through the network approaches the packet handling capacity of the network.

- **Software/Configuration:** The speed and the size of the buffer memory can affect your performance.

Summary:

When you start a new installation, you want it to be a success and that includes a positive experience for all parties, including your production operators and Print Buyers. The guidelines found in this document can help you get the best performance and longest lifecycle from of your network. Being well informed helps set expectations and ensures you get the best Return On Investment (ROI) and the lowest Total Cost of Ownership (TCO) on your Heidelberg Prinect Workflow systems.

The inherent problem with networking is that, for the most part, it just works. You take a cable and plug it into a switch, and are connected to other things and can communicate with them. But, what happens when it doesn't work? Are you getting the performance you should be getting? Is your network connection reliable? Is your network secure?

Even if your network is fine, you should review it on a regular basis. It is always good to get a set of fresh, independent eyes looking at it as well. Advancement in networking is usually driven by three key factors: what can help network vendors sell more, what their largest installed base (usually the enterprise) is clamoring for, and emerging technologies and standards.

At Heidelberg, our first priority is to earn our customers' confidence and trust. If you have custom needs or unique challenges you need to address, we can assist you on a project to achieve a right-sized, future-proofed and worry-free solution for your business. Please contact your Account Manager or Prinect Sales Representative for more information.
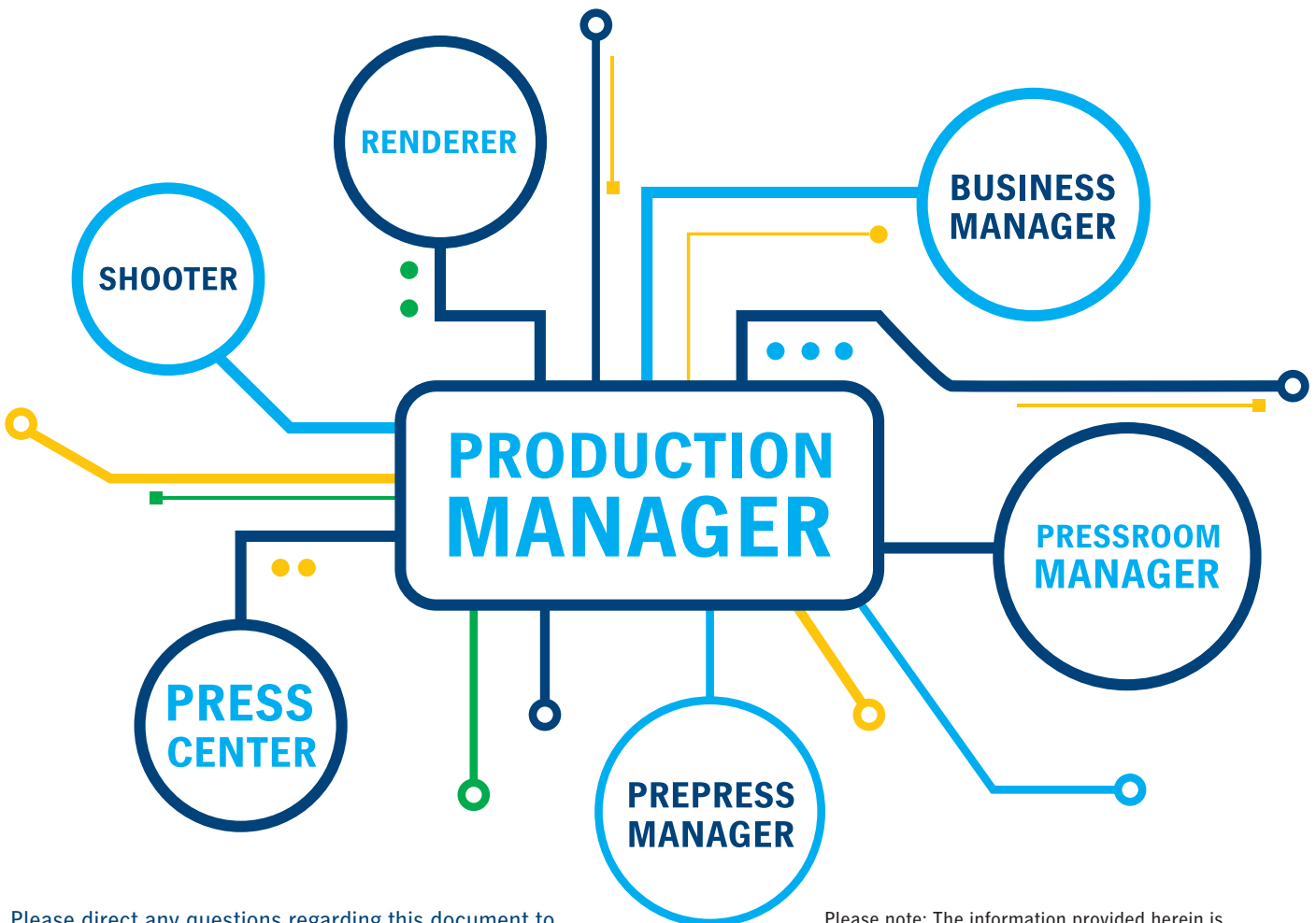
Please direct any questions regarding this document to Eugene F. O'Brien, Senior Technical Support Analyst at: **(770) 794-6205 or eugene.obrien@heidelberg.com**

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