SOLARWINDS
**WHITEPAPER**

# An Easy Guide to Network Mapping in Enterprise Network Monitoring

Follow SolarWinds:

solarwinds

## Introduction

Network administrators create network maps to understand how devices are connected. A network map is a graphical representation of devices and their connections. Network devices like routers, switches, firewalls, and the devices that access enterprise networks, such as PCs, can be pictorially represented in a network map. By providing a single point of reference for administrators, a network map allows them to maintain day-to-day operations and keep track of network infrastructure.
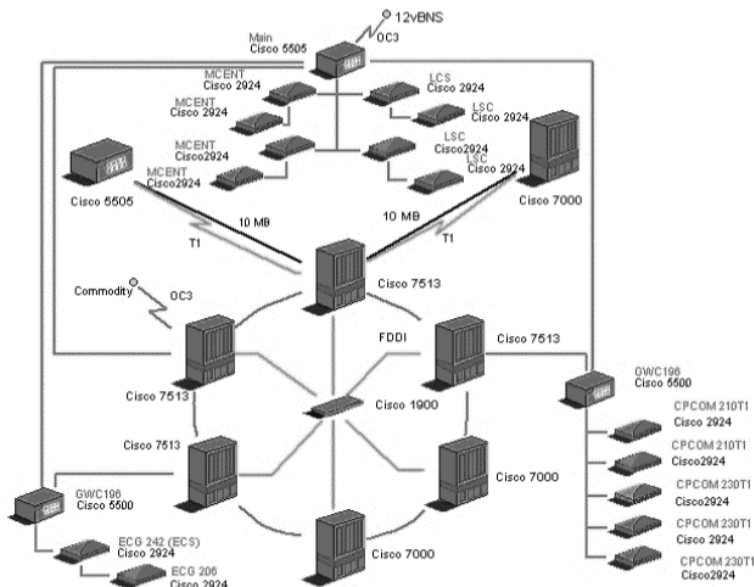
In a large enterprise, network maps are one of the key factors in reducing the time taken for troubleshooting network issues because they help administrators quickly identify and locate devices that cause problems. Network maps can be created manually, using a dedicated network mapping tool, or by using a mapping feature that is integrated within a network management system.

## Different Types of Network Maps

Before the advent of automated mapping tools, administrators manually created a list of devices in a spreadsheet and maintained it with user/device details. To have an idea of how network devices were distributed physically, tools like Microsoft® Visio® were available to help create static diagrams. However, once created, a static map doesn't track any changes in either the network or the topology and it lacks the ability to discover new devices. Moreover, manual admin effort is needed to update static network maps every time a device is added or removed.

All the disadvantages to manual methods has led to the creation of tools for automated network mapping. By automating and easing the mapping process, a significant workload is removed for the network admin. Automation allows maps to be easily updated as new devices are added or topology changes without significant manual intervention.

Real-time dynamic network maps go one step further by automatically detecting changes and updating the map accordingly through auto discovery. They help with troubleshooting by creating a layout of connected network devices alongside key performance metrics. A quick snapshot of a network map gives administrators an edge, not only by keeping them updated on the status of devices, but also by allowing them to assist IT teams in assessing the impact caused by an issue.

*Figure 1- Sample Network Map*

Generally, network mapping tools use different approaches to build a network map such as retrieving MIB data from SNMP agents in routers and switches, exploring with traceroute-like probes and deploying route analytics to retrieve information from routing protocols like OSPF, BGP and EIGRP. Most of the modern network mapping tools use route analytics for discovery, real-time monitoring, mapping and analysis.

- **Layer 2 Network Maps** - Using Link Layer Discovery Protocols, network mapping tools retrieve information available in a Management Information Database (MIB) through LLDP agents. Layer 2 network maps will provide detailed information such as System Name, System Description, MAC address, IP address, port ID, device type, etc. This type of network mapping provides complete information about interconnections. By using LLDP, you can get enough information on your Layer 2 devices.
- **Layer 3 Network Maps** - Most commonly used methodology, Layer 3 network maps give complete information on how the connectivity is between devices. This empowers network administrators to locate and solve the problem immediately. Layer 3 network mapping allows you to discover details like IP address, device type, device uptime, number of ports, OS, inventory, etc.

Advanced network mapping tools combine both Layer 2 and Layer 3 network maps to provide better visual data about the devices on the network, relationships between them, and statuses of their connectivity. Any SNMP-enabled device can be discovered using these network mapping techniques.

## Standalone vs. Integrated Network Mapping

As networks scale up, enterprises constantly face the challenge of keeping track of network devices. Network administrators use both standalone mapping tools and mapping tools that are integrated with their network monitoring solution. Ideally suited for medium sized networks, standalone mapping tools are used to discover network devices and create network diagrams that pictorially represent your network. While standalone mapping tools help admins to understand their network on multiple levels (Layer 2 and Layer 3) by providing detailed device information, they lack important details on how devices are performing.
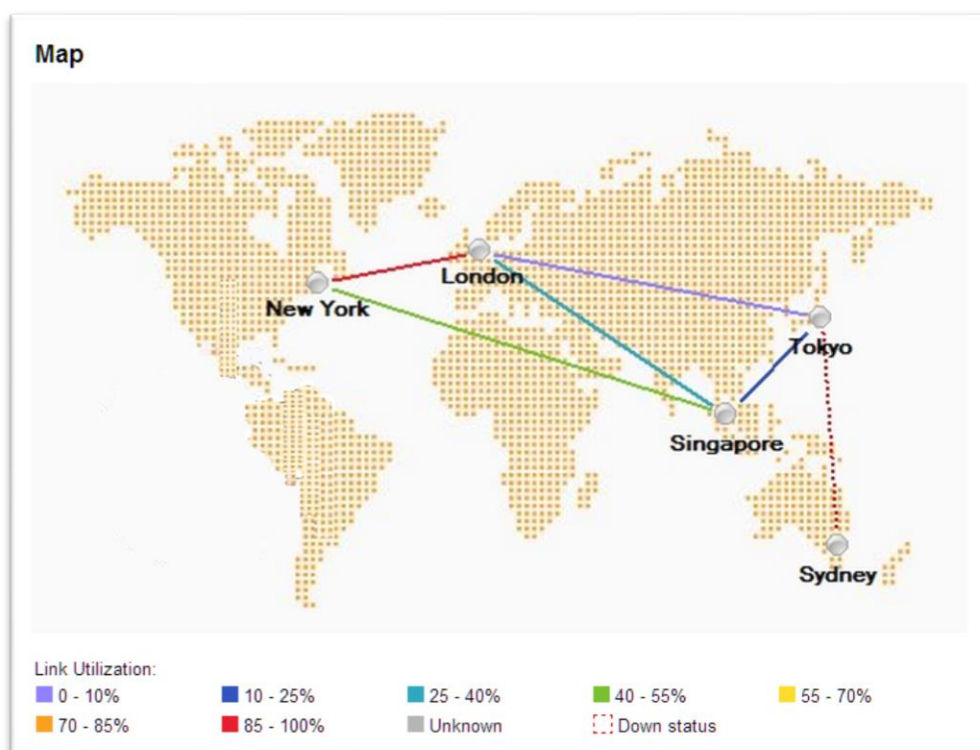
Mapping tools that are integrated with network monitoring solutions provide data on both connectivity and performance of the network devices. Network maps integrated with an NMS reduce back and forth shifting between the maps and monitoring consoles by providing all the statistics in one place. Advanced network monitoring tools integrated with network mapping functionality allow you to drill down from the top-level network map to the device level. Administrators who manage distributed networks across the globe utilize this capability to keep themselves updated on the overall status of network devices in a particular location. You can easily find the list of devices that are down, quickly estimate their impact on the network, and mitigate issues even before your users start to notice any changes.

## How Network Mapping Eases Network Troubleshooting

One of the significant advantages to having network maps integrated into a network monitoring solution is that it allows the network administrator to find the critical issues and troubleshoot them effortlessly. Some of the key benefits of network mapping are listed below.

- **Identify & Troubleshoot Network Bottlenecks** – If you have an advanced network map that provides real-time status on network devices, it becomes easier to locate new issues or network bottlenecks by finding and analyzing the root cause of the problem more quickly.
- **Centralize Resources and Manage Network Devices** – Network maps provide admins with a tangible view of the network making it easier for network admins to understand and visualize the relationship of all the devices connected on their network. They can centralize monitoring and dedicate fewer resources in managing distributed nodes.
- **Assess Impact of Network Change** – Routinely, network admins have to add new devices or change the existing structure of the network based on user requirements. These changes can impact their normal operations. But, when admins use network maps, they can quickly assess impending operational risks by looking at the relationship of those devices and being proactive when there's a change to deploy.
- **Address Regulatory Compliance** –Network maps will help administrators check network compliance for PCI and regulatory requirements. It helps admins to maintain up-to-date information on all device connections and keeps the network diagram current.

- **Ensure Seamless Migration of Network Devices** – If you have users migrating from one department to another, network mapping will help you to keep devices under your radar and ensure continuous connectivity.
- **Map IPs to MAC addresses** – Advanced network mapping provides network admins the capability to map IP addresses to the MAC address of devices. This helps while troubleshooting connectivity or bandwidth issues faced by those devices.
- **Map Link Utilization** - Advanced network mapping provides the capability to visualize the link utilization between the locations on the map.
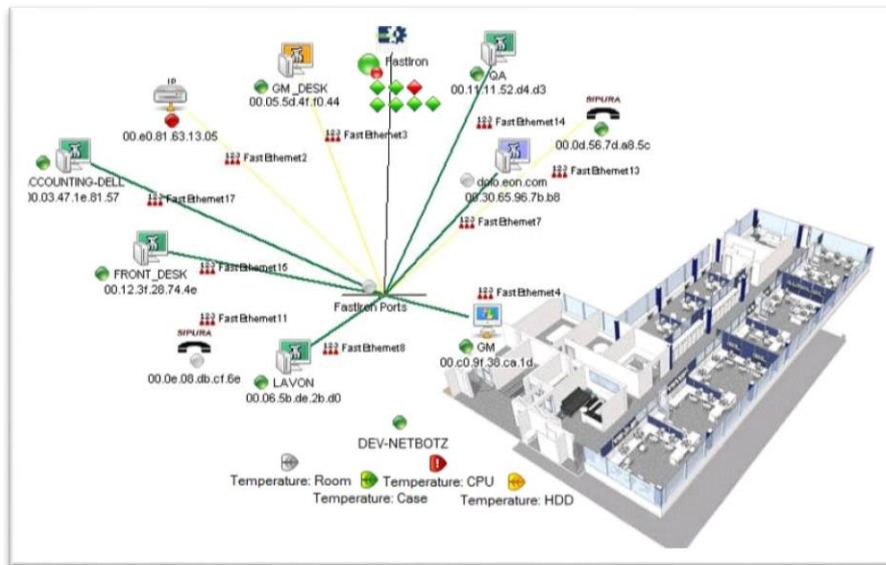
*Figure 2- Link Utilization in Network Mapping*

The image below is an example of how a Top Level Network Map will help you to understand what networks are being monitored in different locations.

*Figure 3- Top Level Network Map*

Device level network maps provide detailed information on the list of connected devices within the location or data center with their IP addresses. Advanced network mapping allows you to drill down into those devices to get more details.
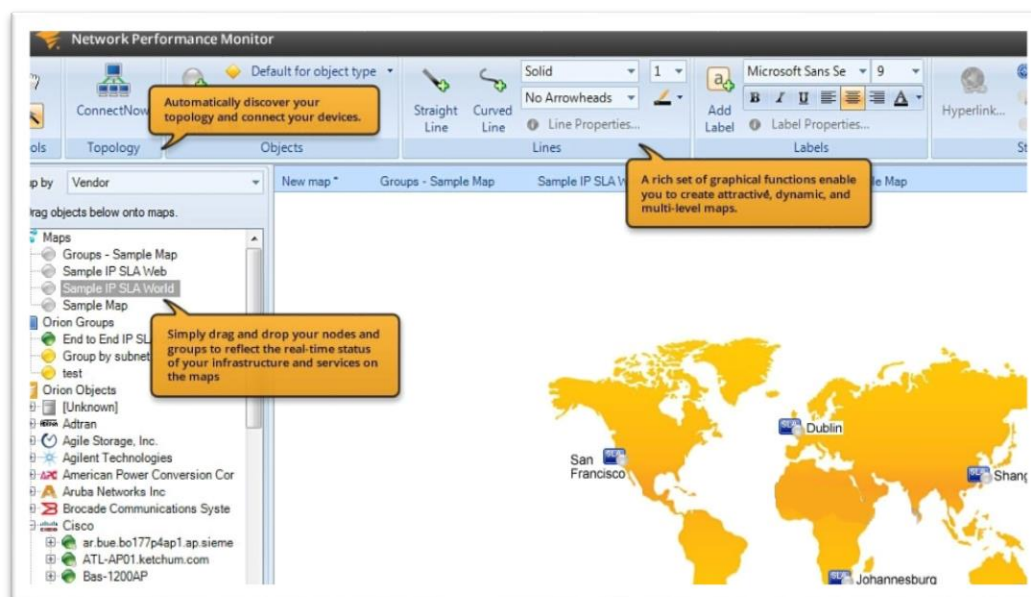


*Figure 4- Device Level Network Map*

## Conclusion

Whether you manage a small network or a large one, it's always best to create a network map to simplify the management of your network. Network mapping has simplified the way administrators manage their networks and helps reduce the time to troubleshoot network issues. Advanced network management systems with dynamic mapping features are capable of extracting, analyzing, and displaying real-time network data and are helpful in scaling, designing, planning, troubleshooting and documenting your network.
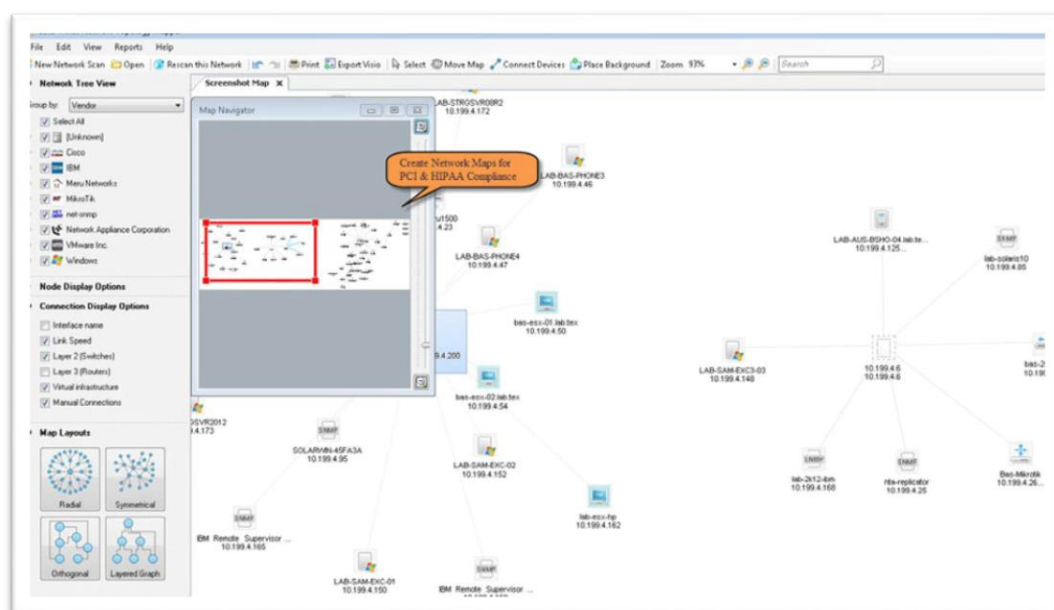
## How SolarWinds® Can Help

**SolarWinds Network Performance Monitor (NPM)** is a network fault, availability, and performance management software that integrates dynamic network mapping. With an interactive map-building interface, you can simply drag and drop network devices, servers, and wireless access points to custom network maps and automatically view connections between devices. Once the map is built, you can view the map on the NPM dashboard to monitor device availability and performance.

- Automatically discover and display connections between devices on your network maps

- Create custom nested network maps remotely from your desktop quickly and easily, with drag-&-drop simplicity

- View your network logically by floor, building, department, or geographic location and drill into more granular views

SolarWinds **Network Topology Mapper** **(NTM)** is a dedicated network mapping tool that helps you manage your network by leveraging a unique multi-level discovery technique, NTM discovers your LAN or WAN and produces comprehensive, easy-to-view network diagrams that integrate OSI Layer 2 and Layer 3 topology data. NTM allows you to quickly scan, discover devices, and get direct access to device details like node name, IP address, host name, system name, machine type vendor, etc. You can now view node up/down status details, connectivity speeds between devices, get a clear picture of the connectivity of virtual devices to your physical network and meet reporting needs for regulatory compliance requirements. Additionally, NTM allows you to export network maps to other formats for documentation purposes.



 

## About SolarWinds

SolarWinds (NYSE: SWI) provides powerful and affordable IT management software to customers worldwide. Focused exclusively on IT Pros, we strive to eliminate the complexity in IT management software that many have been forced to accept from traditional enterprise software vendors. SolarWinds delivers on this commitment with unexpected simplicity through products that are easy to find, buy, use, and maintain, while providing the power to address any IT management problem on any scale. Our solutions are rooted in our deep connection to our user base, which interacts in our online community, thwack, to solve problems, share technology and best practices, and directly participate in our product development process. Learn more at http://www.solarwinds.com.

Follow SolarWinds: