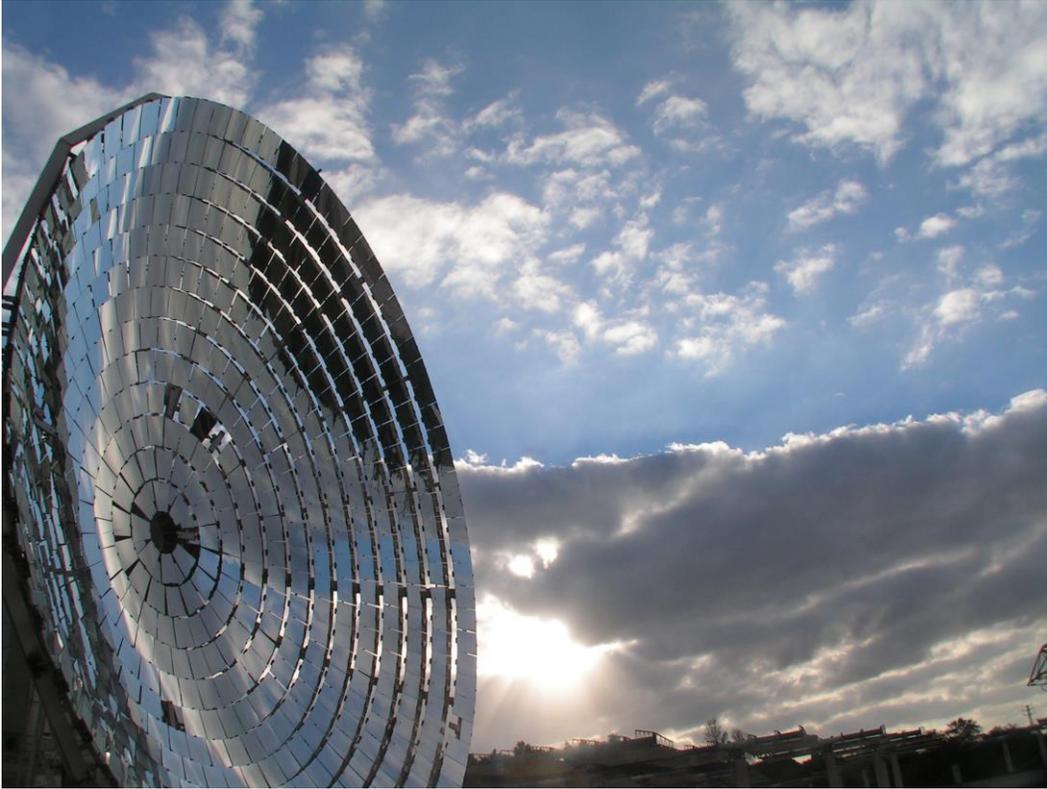


An Antaira Technologies' Paper

## Large Scale Deployments in a Green World: The Importance of Network Configuration Tools

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With climate change concerns, high oil prices, and larger energy consumption around the world, the growing demand for renewable energy sources has increased considerably. As solar applications expand, and multiple solar panel and dish fields become more common, the need for an efficient network configuration and sophisticated management is critical for precise real time management control systems.

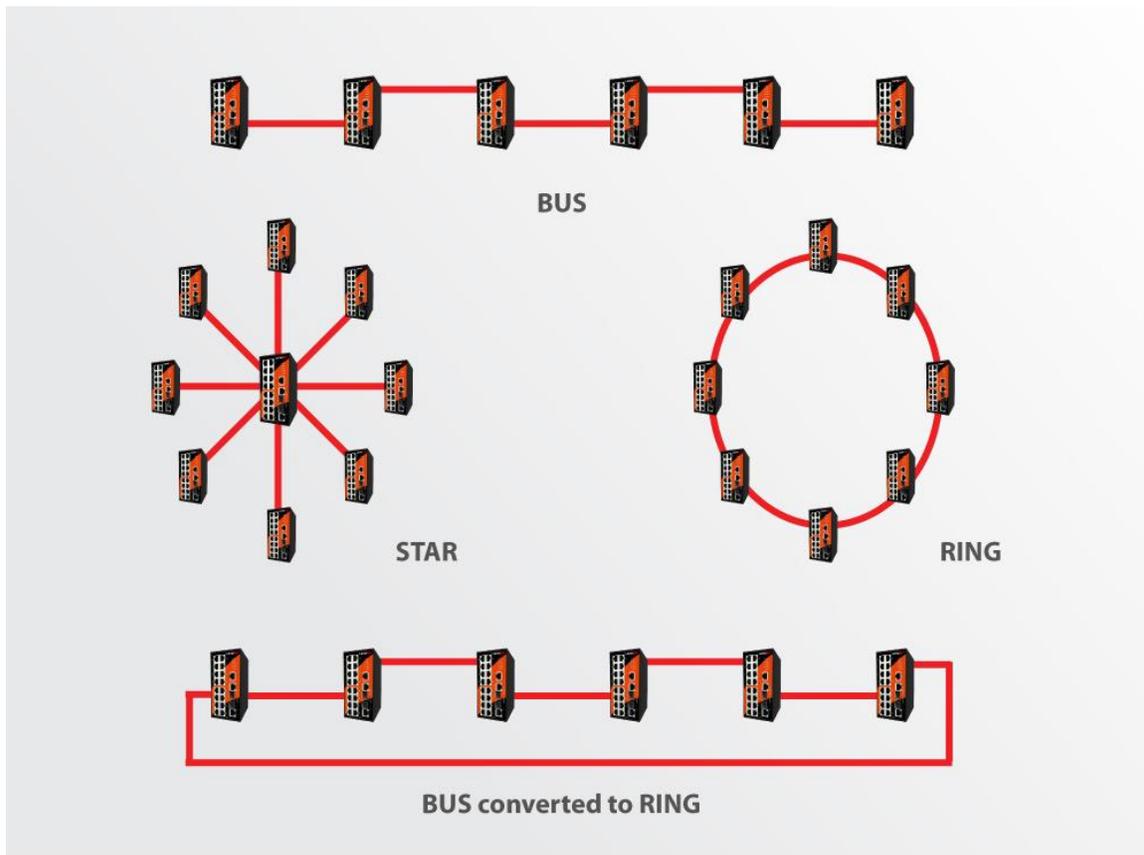
According to a 2011 projection by the International Energy Agency, solar power generators may produce most of the world's electricity within 50 years. As a leading provider in Industrial Networking products, Antaira Technologies' prides itself in providing Ethernet switches and device servers in vital solar applications to help create a greener world.

At a solar generating plant, multiple dishes or panels, in numbers of hundreds to thousands, line the fields to catch the sun for our energy consumption. By deploying a managed switch at each solar generator, monitoring diagnostics and maintaining your field is simple, but network configuration can be tedious and difficult. As a result, Antaira Technologies developed product features and software tools specifically designed for large scale deployments.

Standard copper Ethernet, although very popular and inexpensive, has a limited application due to a 330 foot maximum cable length. Deployment of these long copper cables may also create problems because they can interfere with electromagnetic fields creating noise in your network.

Switches with fiber ports (at least two), as well as copper ports, allow a structural network based on fiber while local devices are connected over short and shielded copper cables that are not as sensitive and do not collect as much electromagnetic noise. Fiber ports also offer a very long connection with a typical maximum distance of 2 Km (6562 feet) for a 100 Mbps multi-mode port. If this distance is not sufficient, a switch with single mode ports can also be deployed offering distances starting at 30 Km (18.6 miles) and reaching up to 120 Km (74.6 miles).

An X-ring topology can be deployed for larger configurations, such as those in a solar application. In standard commercial technology, Ethernet loops are not permitted. In these commercial uses Ethernet networks are mostly built as star or bus topologies.



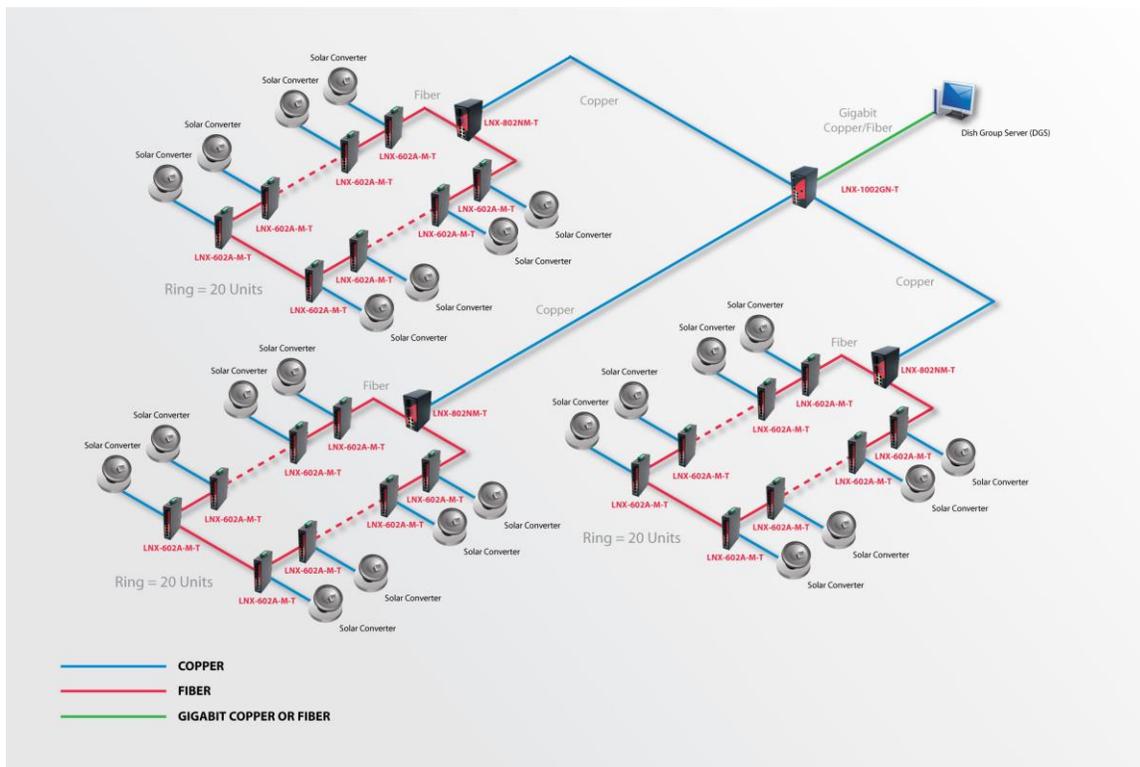
With Industrial applications, a high level of network reliability is desired. At the same time the network should be simple and easy to deploy. An X-ring topology offers simplicity, and a redundancy feature guaranteeing network reliability. The two fiber ports on your managed switch yield an easy daisy chain type of connection. When devices are daisy chained, the X-ring allows the user to connect the last fiber port to the first fiber port, creating a loop critical to the solar generating plant's network.

Configuration is effortless. The user assigns one switch as a ring master and then assigns which ports will be part of the ring (loop). There is no need for installers to know complex redundancy protocols such as RSTP or require more in depth

networking knowledge in order to manage their field without problems. There are a very limited number of things to check with an X-ring protocol to ensure that the ring functions properly making this a very valuable and cost-effective process for installation and deployment.

When properly configured complex redundancy protocols such as RSTP deliver slower recovery times than that of an X-ring protocol. It only takes 20 ms to recover a faulty ring of up to 100 switches. In standard deployment, the ring is closed and data can be transferred through it, however with the X-ring protocol, the ring is virtually open. If any segment is broken or a device is defective, the X-ring will close the link that is virtually kept open to form a Bus type of network in which the defective part becomes an open connection. This mechanism allows the user to have full communication with all devices if a link has been damaged (i.e. cut fiber during construction) or lost (i.e. device has become defective).

In Bus topology, if 100 switches are deployed and switch number 8 is defective, all of the devices past the number 8 switch will be lost (92 devices with lost communication), but with an X-ring protocol, the link will be rebuilt by way of the opposite direction. Device number one will send traffic to device number 100 (loop link will be closed) and effectively only device number 8 will be down. Communication with the remaining 99 devices will be possible. Once the damaged link or defective device has been repaired, the X-ring will automatically detect the switch, keeping one link virtually open as a safety net in case of any other equipment or fiber media malfunction.



With large scale deployment even a very simple configuration could become a complex task. Simple assignments of IP Addresses for each switch is trivial when dealing with 10 devices, however when thousands of devices must be configured, the task gets difficult and time consuming. Manually assigning features and settings to a large number of switches could not only increase the chances of a mistake, but could also be costly. It could take days just to assign IP addresses, Subnet masks, and Gateways, but what about other settings for the switch? Therefore, Antaira developed easy to use software, so that the user can group multiple switches and assign features or settings specific to their network quickly and conveniently.

In a normal network a switch has its own unique IP address, but before a switch is configured to the user's network, the factory assigns the same default IP address to each switch. Duplicate IP addresses can create communication conflicts within your network, and therefore each switch must be assigned a new IP address. Antaira's Commander Software allows the user to connect all of the switches together in factory default configuration. Using broadcast messages, the Commander can find all of the switches connected in the field and list them by their MAC addresses (this address is unique world wide for each networking device). Using this software, the user can also assign IP addresses either from a specified block range or a DHCP server. A job that could manually take up to days to do can be done within a few seconds.

Commander - License for 100 devices only  
Task Settings Help

Discovery Discovery Filter Login Logout Auto Logout Reboot Open Web Refresh Refresh All Group IP Wizard Group Firmware Wizard About

Sort Devices By: None

Commander  
Devices (20)  
All Devices  
(192.168.10.1, 00:1E:94:13:02:A0)  
(192.168.10.1, 00:1E:94:13:02:9F)  
(192.168.10.1, 00:1E:94:13:02:A2)  
(192.168.10.1, 00:1E:94:13:02:96)  
(192.168.10.1, 00:1E:94:13:02:97)  
LNX-602N-MM-T (192.168.10.1, 00:1E:94:13:02:9E)  
(192.168.10.1, 00:1E:94:13:02:9E)  
(192.168.10.1, 00:1E:94:13:02:92)  
(192.168.10.1, 00:1E:94:13:02:94)  
(192.168.10.1, 00:1E:94:13:02:99)  
(192.168.10.1, 00:1E:94:13:02:95)  
(192.168.10.1, 00:1E:94:13:02:9A)  
(192.168.10.1, 00:1E:94:13:02:9B)  
(192.168.10.1, 00:1E:94:13:02:91)  
(192.168.10.1, 00:1E:94:13:02:93)  
(192.168.10.1, 00:1E:94:13:02:98)  
(192.168.10.1, 00:1E:94:13:02:90)

## Group IP Setting Wizard

Configure the IP address range or DHCP

DHCP  
Server IP: 0.0.0.0

IP Range:  
IP Begin: 192.168.10.1  
IP End: 192.168.10.20  
Netmask: 255.255.255.0  
Gateway: 192.168.10.254

Model	MAC	Original IP
LNX-602N-MM	00:1E:94:13:02:9C	192.168.10.1
LNX-602N-MM	00:1E:94:13:02:A1	192.168.10.1
LNX-602N-MM	00:1E:94:13:02:9D	192.168.10.1
LNX-602N-MM	00:1E:94:13:02:90	192.168.10.1
LNX-602N-MM	00:1E:94:13:02:98	192.168.10.1
LNX-602N-MM	00:1E:94:13:02:93	192.168.10.1
LNX-602N-MM	00:1E:94:13:02:91	192.168.10.1
LNX-602N-MM	00:1E:94:13:02:9B	192.168.10.1
LNX-602N-MM	00:1E:94:13:02:9A	192.168.10.1
LNX-602N-MM	00:1E:94:13:02:95	192.168.10.1
LNX-602N-MM	00:1E:94:13:02:99	192.168.10.1

Global firmware updates and function setup are just as easy. Just discover devices by broadcast or by IP range and deploy a firmware upgrade separately or as a group depending on which devices need to be updated. Having the most recent firmware assures the best performance and confirms that all known problems are fixed. The user can also set features for one switch and populate those settings to all selected switches. For example, if the user wants port 5 and 6 to be part of the X-ring configuration, they can populate their settings to all of the switches, therefore making global upgrades and setup quick and convenient.

Not only does this software make tedious and time consuming work less of a hassle but it can also back up features a user has assigned to a switch. For example, the user wants to add 4 new dishes or panels to their solar generating field. Additional switches must be added to their network and switch one must be configured to the same settings as switch 56 and switches 2 through 4 must be configured to the same settings as switch 78. This could be truly hard for an average person to recall especially with upwards of hundreds of switches, but with this software there is no need for the user to reprogram the right settings for that switch. By simply exporting the configurations for each switch to the database when setting up the network, the user can save any configuration for backup and apply these settings to any switch in their network in as little as a few seconds whether it be an existing device or new one.

In the future, solar energy will be a significant energy production and generating plants could be essential to our grid stability. Safety, reliability, and efficiency in these applications are critical to its survival. With a normal Bus formation and manual configuration, multiple solar converters and precious time could be lost. An X-ring topology and Antaira's Commander Software provides faster configuration, quick and convenient maintenance, and efficient data transmission for larger deployment networks critical to solar generating plant applications and what may be our future energy consumption.