Using MAC Addressing as a New Feature of JumboSwitch®

TC COMMUNICATIONS®

Application Note

While TC Communications' standard JumboSwitch® is equipped with IP connectivity, which allows users to connect ports on any card to similar ports on any other card in a JumboSwitch network, some customers have inquired about the possibility of using MAC addressing for JumboSwitch instead of IP addressing.

This paper illustrates typical IP addressing on JumboSwitch and how MAC addressing will work as a new standard, yet optional, feature on new JumboSwitch units going forward.

Introducing MAC Addressing for JumboSwitch

For years, IP addressing has been the sole method TC customers have used to connect JumboSwitch devices. Recently, several customers, particularly those in the utility industry, have approached TC Communications with a concern.

Organizations must be compliant with NERC CIP if they are using routable protocols, more specifically CIP-002 through CIP-009. This standard is applicable to routable protocols as described in the OSI model Layer 3 or higher, which covers IP addressing.

Customers have requested a modification to the JumboSwitch to allow for MAC addressing, a non-routable protocol, to meet compliance requirements according to this definition. In response to this request, TC Communications has modified the standard JumboSwitch to include optional MAC addressing in addition to IP addressing.

What is NERC CIP?

NERC CIP, or North American Electric Reliability (NERC) Corporation Critical Infrastructure Protection (CIP), is a set of mandatory cybersecurity standards for routable protocols designed to secure the Bulk Electric System (BES) in North America. These standards, developed by NERC, aim to protect the systems that generate, transmit, and distribute electricity from cyberattacks and other security threats.

NERC CIP standards cover a wide area of security measures, including cyber asset identification and categorization, security management controls, physical security, system security management, configuration change management and vulnerability, information protection, and more.

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How to Upgrade to MAC Addressing

This feature is an enhancement of all new JumboSwitch products being produced, so for new customers, this is a built-in feature.

Existing customers currently using an older generation of JumboSwitch and who would like to take advantage of the new MAC addressing feature can contact TC Communications' Technical Support Staff, who will assist them in that process.

For those existing customers with active support agreements, this enhancement of previously purchased JumboSwitch equipment is considered a free upgrade. Those who do not have a support agreement and would like to upgrade can either obtain a support agreement or can receive this upgrade with a one-time charge for support.

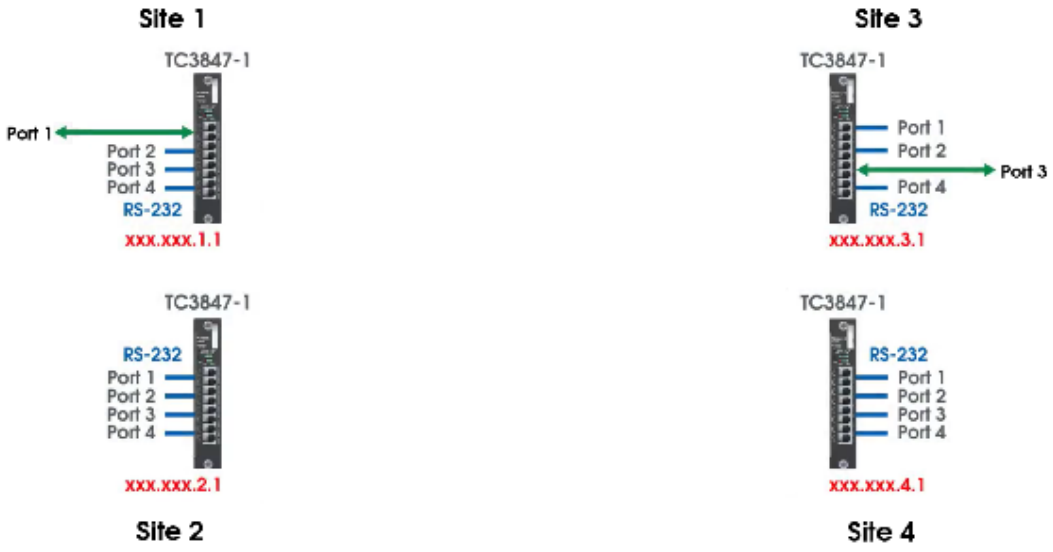
For more information, please visit tccomm.com.

Differences Between IP and MAC Addressing

The rest of this paper will look at the differences between IP and MAC addressing as they apply to TC Communications' JumboSwitch.

IP Addressing Example

In the diagram below, an IP network with four sites and four ports per site is being used for RS232 serial signaling. Any one of those ports can be connected to any of the other ports in the network. Each card has been assigned an IP address (shown in red) which identifies the unit and each port.



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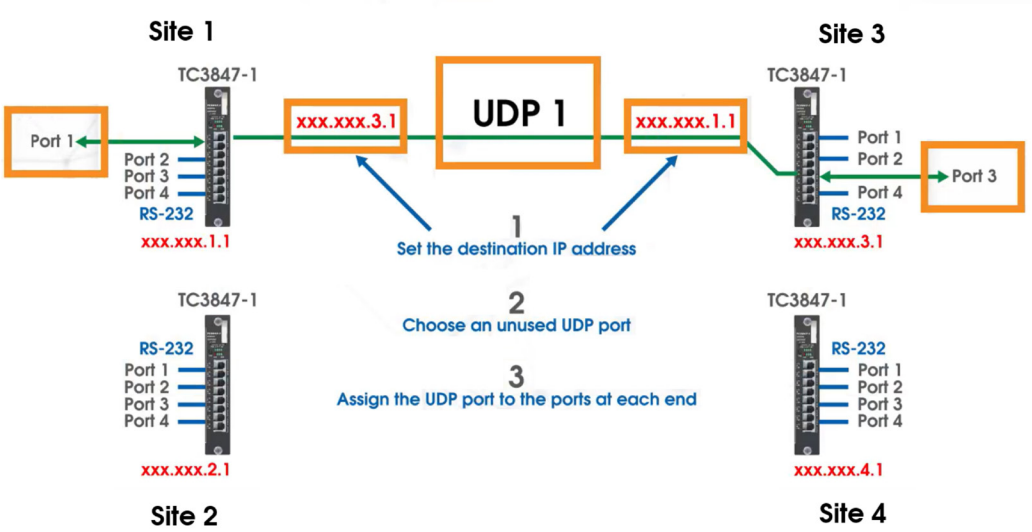
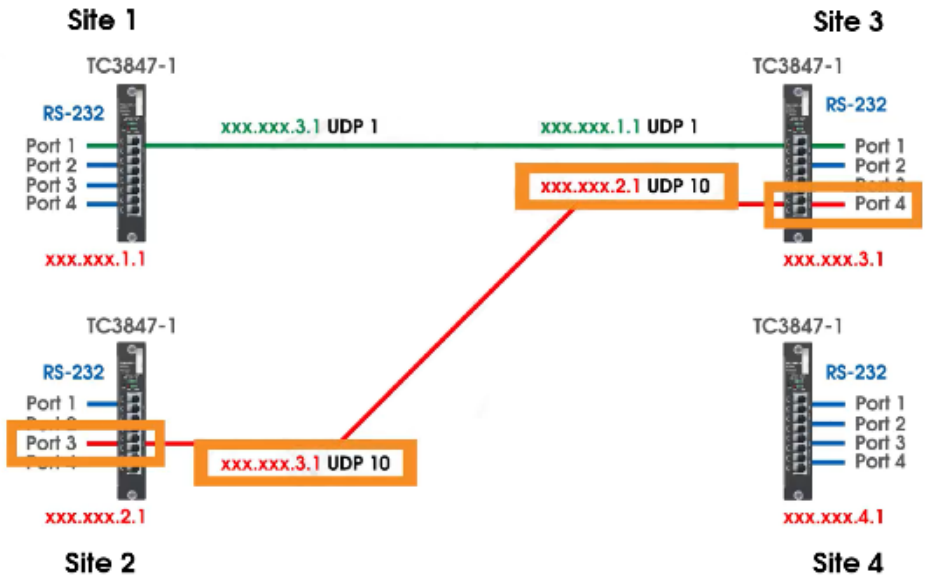
If a user wants to connect Site 1, Port 1 to Site 3, Port 3, for example, they can set the destination IP address of Site 1, Port 1 to communicate with Site 3. Likewise, for Site 3, Port 3, the user can set the destination IP to communicate with Site 1.

Then, the user can assign the two ports to an unused UDP port, in this case UDP 1, and if the IP addresses are set correctly, the ports will now communicate.



The remaining ports can be connected in the same manner. For example, Site 2, Port 3 could be connected to Site 3, Port 4 and assigned as UDP 10.



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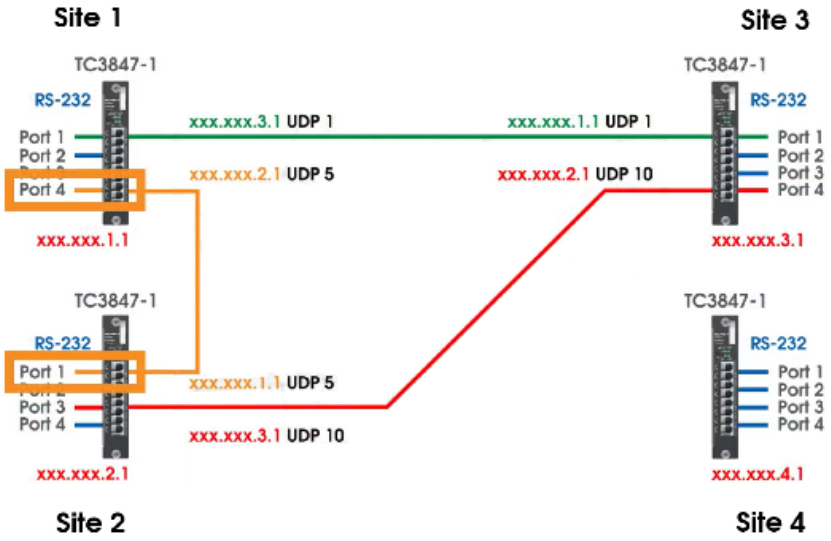
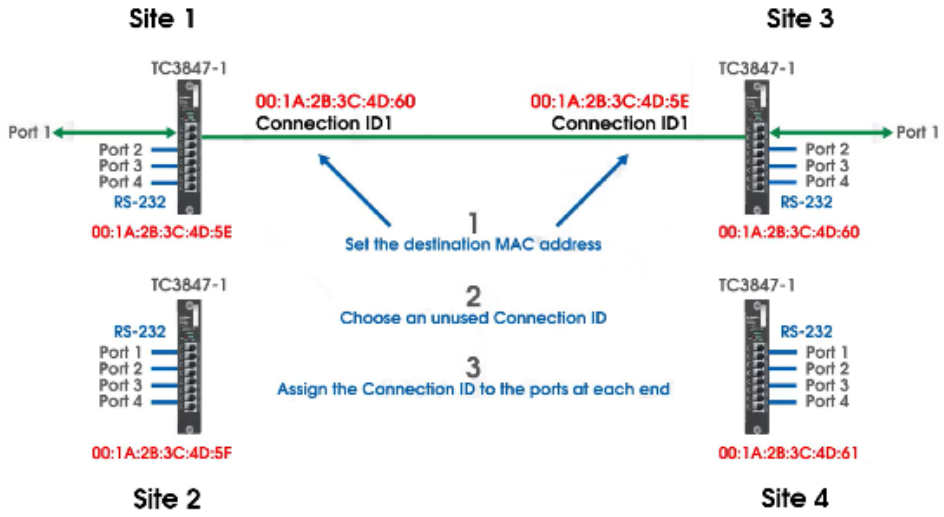
As a further example, Site 2, Port 1 could connect to Site 1, Port 4 and be assigned as UDP 5, and so on. It is very simple.



MAC Addressing Example

A MAC address is unique to a particular device, so each JumboSwitch card will have a dedicated MAC address. Unlike with IP addressing, however, users cannot change the MAC address; it is essentially fixed. Nevertheless, setup is very easy and follows the same process as in the previous examples, with the only difference being the type of address used.

Here, each MAC address has been chosen at random. If a user wants to connect Site 1, Port 1 to Site 3, Port 1, which has a different MAC address, the user assigns the card and port at Site 1 the destination MAC address, chooses an unused connection ID, and does the same at Site 3.



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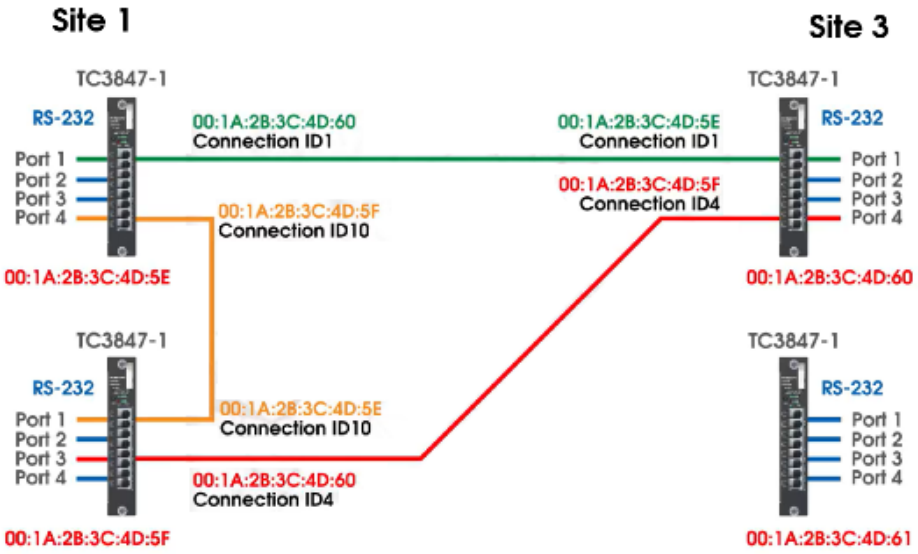
Once those steps are completed, the two ports will connect exactly as they would when using IP addressing. The same process will work for each connection.



Customers currently using an older generation of JumboSwitch can contact TC Communications Technical Support Staff by calling **949-852-1972** or emailing TechnicalSupport@tccomm.com to discuss receiving the MAC addressing feature upgrade.