



The Realities of IT and OT Integration

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The Industrial Internet of Things (IIoT) and Industry 4.0 technologies have been the driving forces behind the Smart digital revolution that we are witnessing today in our industrial industries. The introduction of Advanced Networking Technologies, Machine Learning, and Artificial Intelligence has opened the door to a new type of operational intelligence that is revolutionizing our industries.

Companies integrating themselves into the Smart digital revolution often run into problems. Integrating IIoT and Industry 4.0 intelligence also involves converging IT (Information Technology) and OT (Operational Technologies) networks that traditionally have been separated and operate in fundamentally different ways.

IT system operations usually involved standardization of hardware and software platforms, focused on the user's experience and privacy. OT system operations primarily focus on the functionality of machinery that operates using individual controls and processes.

Converging these two networks can be highly beneficial when done correctly and can have long-lasting unwanted effects if not integrated properly.

Integration

While many companies have had tremendous success with their IT and OT network integration, there have been many known to fail. The reality is, upgrading to a Smart factory or plant from a traditional environment can be a long and arduous process, filled with costly setbacks, delays, and uncertainty in the newly converged network.



A Strategic Plan

It has been said that "the best defense is a great offense." In the world of integration, the best way to avoid failure is through strategic planning, collaboration, and validation. Undoubtedly the

best tool you will have for your integration process is a strategic plan. A well thought-out and strategic plan will save you time, resources and will make the convergence of your IT and OT networks a much easier process.

The strategic plan you create will be unique to your network itself. It will include specialty items and configuration requirements that are specific to your networking needs. However, in addition to your plan, be sure to include the following underlying principles. They will help guide you through your integration process.

Basic Integration Principles

- **Organization:** The success or failure of your implementation will largely be determined by how well you organized and planned for your network integration.
- **Implementation:** The Implementation stage will be the “make it or break it moment” in your network integration.
- **Validation:** Network validation is your last line of defense against any misconfigurations, network instabilities, and faulty programming.

Organization

Without proper organization, your network convergence process will more than likely fail. As you begin the organization process, be sure to include the following elements:

Planning

- Your plan should begin with the end goal in mind. Having a clear understanding of what the drivers are for your converged network will help determine which is the best path or direction to take for the integration process.
- The plan should also be broken down into stages with ample time for each stage.
- Finally, your plan should be organized by different departments and groups that will be involved in the convergence process.

NOTE: As you go through your planning phase, don't forget to include disaster recovery and emergency stop/shutdown procedures.

Products

As you carefully select the products or technologies that will be implemented into networks find out information on any future changes. Finding firmware updates or revisions that will cause communications issues with the systems that are in place is essential. Also, find out about warranty coverage and product support from manufacturers. The plan should also be broken down into stages with ample time for each stage.

- Knowing what products or technologies you're implementing will have a significant impact on your network integration.
- Be sure to verify network compatibility with the new products or technologies you wish to implement. Be aware of any specific upgrade requirements or additional equipment needed for a specific device or technology to function properly.

- For any new products or technologies that might be unfamiliar to your staff, check for training courses or other educational avenues you can pursue that will provide a basic understanding and functionality for your new products or technologies.

Personnel

Successful convergence of your IT and OT network will be a team effort. Your team should include those individuals considered field or service experts.

- Your plans should also include key personnel from the different departments that will be involved in the integration process.
- Each person or group should have a specific role and responsibility, including post-convergence responsibilities such as maintenance, security, incident reporting, stop/start & emergency shutdown procedures.
- Be sure to include any hardware and software vendors whose systems might be involved in the process. You might find they have experience dealing with scenarios similar to yours and can offer insight in avoiding painful missteps and costly mistakes.

Antaira Technologies can be an invaluable asset to your integration team. As a free service, we offer design consultation, configuration support, and compatibility testing.

We offer free training on all industrial products as well as specialized training on networking technologies such as port tagging, trunking, and 802.1x security features that may be part of the requirements of your new system.



Implementation

The basic principle of implementation is managing the data flow process. Depending on how well you manage the data flow process will ultimately be the determining factor of your successful network integration.

Managing your data flow begins by answering the following questions:

- What systems or machinery will be generating data?
- What systems or technologies will be involved in managing the data flow?
- Where will the data be collected?
- Once you've collected the data, how will it be managed and interpreted?
- Lastly, who will have access to the data?

Once you have answered all these questions down to the last detail, you are ready to begin.

Before you Begin

Before you begin converging your networks, remember, integration starts with documentation. Having complete detailed documentation of your network, controls systems, and other systems necessary for the IT & OT convergence is essential. Spend the time and extra resources needed to ensure you have up-to-date documentation on all of your systems and services.

Before you begin making any changes, you must back up critical systems files and configuration and have a stored copy of the back-ups.

NOTE: Thoroughly test active backs-up before making any changes to your systems or network. Realizing your back-ups are not fully functional and cannot be used to restore your systems to original working order after a major configuration change, is not a position you want to find yourself in.

Finally, before you begin, make sure to have one final meeting with your team to ensure everyone is on the same page with the changes that are about to take place.

Make it or Break it Time

As you move forward with your network convergence, remember to track your progress and check off milestones as you complete them. Each step forward should be celebrated and documented. Not documenting your progress could lead to the unravelling of your successes during the troubleshooting and validation phases of the integration.

Also remember, that dealing with multiple systems, legacy machinery, and proprietary communication protocols from various vendors and manufacturers can be extremely difficult. Typically, different forms of communication do not interact well with each other.

For instance, the Modbus protocol doesn't easily communicate with Ethernet without a special adaptor or converter.

Be sure to take advantage of all the tools at your disposal. One tool that has been extremely useful during network integrations is Sandbox testing. Sandbox testing gives engineers the ability to create a virtual environment or a separate parallel networking environment used for deployment and isolated scenarios.

Security

Securing your converged network is going to be one of the biggest challenges you face during your integration. IT and OT have different security policies and require different approaches in dealing with security incidents. Be sure to check into what the security requirements are specific to your industry and the regulations that must be followed in dealing with user access, breaches, and incident reporting.

Validation

Validating your converged network is a critical step that is often overlooked. In many instances, once the network is up and running, administrators switch their focus to leverage their new collected data instead of ensuring the network can withstand a sudden system failure, security breach, or power outage.

Validating your network through failure scenarios that include responsible parties, their response efforts, and mitigation resolutions is the ideal way to validate your network. The validation process will give you peace of mind and confidence that your newly converged network will perform well even when unforeseen incidents happen.

Without proper network validation, the consequences of a small outage can turn into a problem of larger proportions.

NOTE: The best way to avoid delays and communication problems after a network outage is through validation and failure testing.

