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Utility Network Data Migration: Best Practices

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Table of Contents

Executive summary	4
What is the motivation for this migration?	4
What tools are available for supporting the data migration?	5
Workflow overview.....	6
Data modeling	10
Data quality control and remediation	14
Migration tools.....	17
Validating the utility network	21
Finalizing the migration.....	26

Utility Network Data Migration: Best Practices

Executive Summary

ArcGIS Utility Network Management is an ArcGIS Enterprise extension that helps you model and manage your utility or telecom network in ArcGIS. The extension provides a framework for utility asset management, as well as tools for network modeling, editing, and analysis. These capabilities let you deliver a comprehensive view into the current state of the network. With this level of visibility, you can better understand your network, make more informed decisions, and deliver more reliable services to customers. To implement more advanced analytics and total platform capabilities in a services-based architecture, you will need to migrate your data to take advantage of the new utility network information model.

What Is the motivation for this migration?

The objective of this white paper is to provide context for some of the conceptual elements of the utility network and offer guidelines for implementing a Utility Network configuration and data workflows. In this document you will better understand the process to migrate your data to the utility network and challenges you may encounter. After reading this white paper, you should be able to plan the various phases of the data migration and have some understanding of what to expect from each phase.

What tools are available for supporting the data migration?

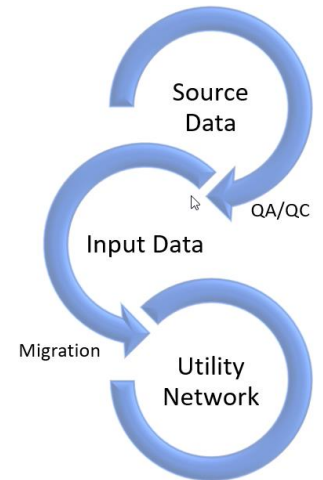
Migrating to the utility network utilizes the following three solution components:

- ArcGIS Data Reviewer extension provides preconfigured batch jobs (.rbj) that can be used to validate, maintain, and improve the integrity of utility data. ArcGIS Data Reviewer provides a set of tools to simplify many aspects of automated and visual data quality control. ArcGIS Data Reviewer provides over 40 out-of-the-box checks that can be run individually, grouped into batch jobs, or run as a scheduled service. The batch jobs provided with [Data Reviewer for Utilities Solution](#) are configured to work with the most common data models.
- The utility network solution deployment configurations include an industry specific asset package. An Asset Package(AP) is a simple way to share the schema of a utility network schema as a file geodatabase. The AP contains schema for common components, subtypes, domains, network rules to define network behavior, subnetwork definitions and sample data. It can also contain all the data and configurations for a utility network. The solution deployments provide step-by-step instructions for creating a utility network and deploying the network to an ArcGIS Enterprise organization. In addition, it includes ArcGIS Pro projects for configuring and publishing the utility network services.
- ArcGIS Data Interoperability extension provides powerful data manipulation tools to extract, transform, and load data. It is a key tool to migrate existing data into an asset package that will be loaded to a staged utility network. The sample utility network migration workspaces (available on [GeoNet](#)) are configurable and can be customized to work with non-standard data models and various source data. These workspaces are specifically configured to use the asset package supplied by the utility network solution deployment tools. The workspace outputs the necessary schema and features to an asset package for loading into a utility network. The sample migration workspace also enables the creation of network associations and devices that produce a fully functioning network output.

In the following sections we will review the workflow leveraging these components and discuss practical considerations for each.

Workflow Overview

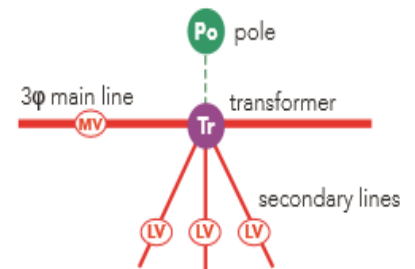
Conceptually, the process for migrating seems linear as shown in the graphic on the right. Source data is run through quality control (QC) to validate the data against a predefined set of rules. Data errors are then pre-processed through data editing clean-up procedures. The clean source data is then pushed through a secondary process to transform the source schema and data into the target utility network-ready asset package. As you will see, the actual workflow is a non-linear and iterative methodology.



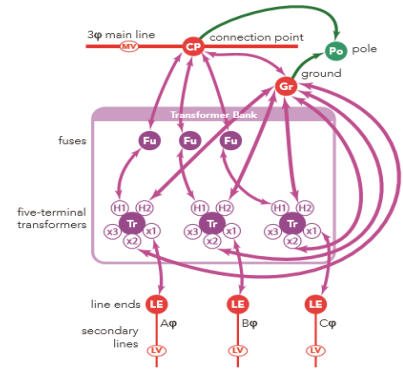
The migration workflow you choose depends on your goals of the target output representation. By understanding what the target representation of your data will look like, you will better understand the overall migration process. There are three general data migration representation patterns in a utility network:

1. Simple—data migrated in its current form from the source data. Using this approach will not allow you to take full advantage of the capabilities of the utility network.
2. Basic—modeling and representing the real world to better support analytics within and outside of GIS. Many external modeling and analysis packages require a more complete representation of the data. Using at least a Basic pattern promotes an easier exchange of data with these other packages.
3. Advanced—modeling in greater detail than basic to support planning, design, and advanced analytics within the GIS

To visualize the difference between these levels of data modeling complexity, the illustration on the right shows how data modeled in the geometric network can be loaded into the utility network data model using a simple migration. The resulting utility network would have same number of features and very similar configuration to the original. The benefit of this approach is the relative ease of migration and resulting parity in network functionality.



The same data illustrated above can also be migrated with a much higher degree of fidelity as illustrated with the graphic on the right. The benefit of this configuration is that individual devices, phases and voltages are modeled through the transformer using connectivity associations and containerization. The level of data complexity and data migration effort for this migration is significantly higher than the previous example.



Due to the distinct differences between the electric data modeling requirements and configuration compared to both gas and water to support utility network functions, some recommendations are specific to either electric or non-electric migration workflows. In these instances, the text will be highlighted as such.

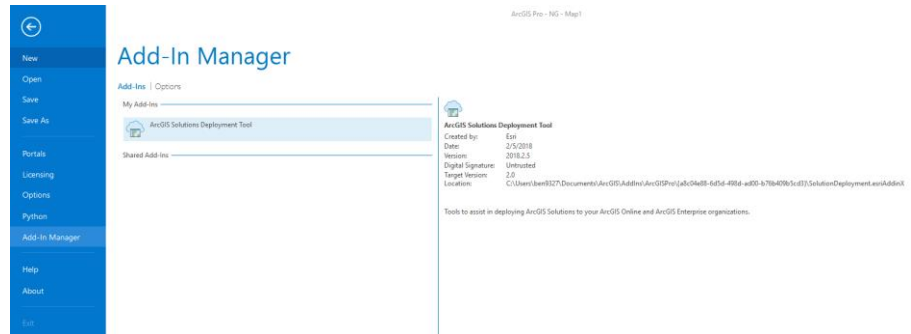
In the next section we will describe the preparation required before starting the data migration process. There are also several Esri training classes that introduce the ArcGIS Platform, the migration workbench functionality, Utility network concepts, and administration. The information provided in these classes is extremely valuable for informing data model decisions, configuration requirements, and troubleshooting.

Preparation

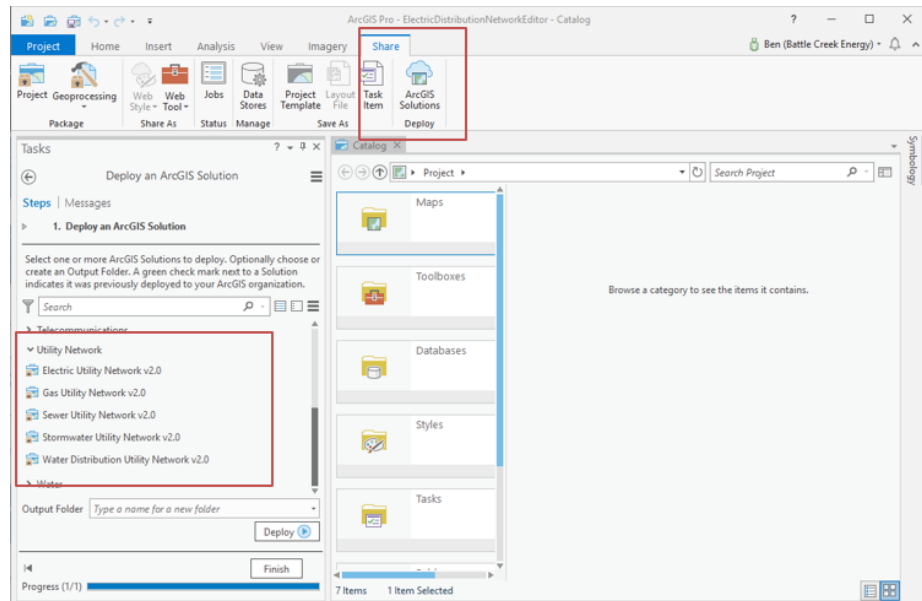
To begin the data migration process, there are a few prerequisite items to inventory and prepare:

- Portal for ArcGIS: This software is required primarily for final steps of building and deploying the utility network database and publishing the services to the organization. Install using either [Enterprise components](#) or the ArcGIS [Enterprise Builder](#).
- ArcGIS Pro: ArcGIS Pro is required for executing many of the tools provided for working with the utility network data migration. The system requirements for ArcGIS Pro are available [here](#).
- ArcGIS Interoperability extension: This extension is required for running the data migration workspace. A licensed copy of FME can also be used

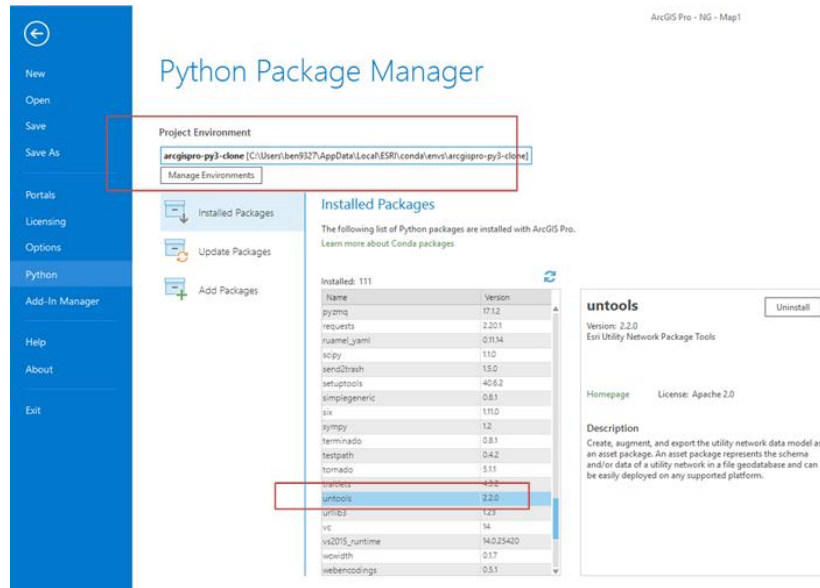
- [ArcGIS Solutions Deployment Tool Add-In](#): Required add-in to ArcGIS Pro that will be used to deploy the utility network Configuration.



- [ArcGIS Solution Utility Network Configuration](#): The domain specific ArcGIS Pro project maps and asset package that will be used throughout the process



- Pro-Python Environment: Since the deployment requires extending the Python site package list, a custom cloned environment is needed. Create one [following these instructions](#).
- Untools site package: Installation of this site package provides additional tools for the Utility network deployment process including specialized tools to facilitate working with the asset package and staging a utility network.



Upgrading relationship classes: If existing geodatabase relationships exist and will be migrated, they must be based on GlobalIDs.

Data Modeling

Once the prerequisites are in place you will have the latest Utility Network Configuration asset package. This is the beginning of the data modeling effort that will define the transformation of the data. This is a common process used whenever data is migrated between environments.

Schema Mapping

Fundamentally, the existing source data will need to be transformed from its current state into the target utility network schema (in an asset package format). The specific purpose of this task is to define the high-level mapping that will define source-to-target matching of feature classes. Data mapping choices here include the following:

- Which objects belong in the utility network vs. outside of the network. These could include non-network feature tables, non-network feature classes and tables.
- Which user defined fields need to be maintained in the target utility network schema.
- Which existing tables and relationships are deprecated or restructured in the utility network, such as relationships converted to associations or assemblies.

An example of this mapping is shown below from a geometric network to a utility network:




Note that some data from stand-alone tables and relationships in the geometric network will be modeled by spatial objects or associations within the network itself. While their representation may change, the data will be maintained in the utility network.

Object Mapping

Once the source features are identified and mapped to the target schema, the existing attribute objects of the features need to be mapped to utility network objects. This task requires a deeper understanding of the source data and how it will be represented in the target, because it requires evaluating each feature type and ensuring it is properly mapped to an existing utility network object. A utility network object is defined as a unique combination of feature class, asset group, and asset type fields. Object and field level considerations include the following:

- Feature subtyping for asset groups / asset types
- Field data type transformation
- Domain value transformations
- Related record and look-up table transformation
- Existing triggers

Esri's data migration workspace templates provide a mapping spreadsheet as a starting framework, documentation of the process, and a domain-specific workspace migration template. All of which are included in the download. The ArcGIS Data Interoperability extension workspace reads the schema mapper spreadsheet, which parameterizes the data mappings for the data transformer so that data mappings can be configured in a central location.

	<ul style="list-style-type: none">• Required attributes are identified in the attribute managers as the fields being renamed. Focus on mapping all these fields. Once mapped, you will need to then focus on the values in each field because selection logic assumes the source data domains and values. Your choice is to transform the values or modify the workbench logic in the various test filters and attribute creators.• Often fields are needed to complete an asset type definition or attribute mapping is found on a related table. The join field can be used to get all the attributes in the right place.
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Asset Groups and Asset Types in the utility network

To fully appreciate the importance of the object mapping we will take a short sidebar and discuss Asset Groups and Asset Types (AG/AT) in the utility network. Looking at the transformer feature class from the geometric network as an example, the subtypes in the feature class (step transformer, Overhead, underground) become the Asset Groups, in the utility network. Asset types are then defined based on the number of phases the transformer supports

Conceptually, all network behaviors are configured at the object level which is defined as a unique feature class, asset group, and asset type combination (AG/AT). This means that for every network configuration, all network rules including connectivity, association, and containment, are defined for each unique AG/AT by name.

- If the AG/AT changes are to a line feature, connectivity settings also apply.
- If the AG/AT is a subnetwork controller, then subnetwork definitions also need to be updated.



- Any modification to the AG/AT whatsoever requires utility network configuration changes. Network configurations are stored referencing the AG/AT descriptions, so changing even the domain description will require changing all the related utility network configurations. Within the AP, a rename table propagates AG/AT name changes to network rules and configurations.

If using the data migration workbench, invalid AG/AT features are routed to the error GDB. However, all Invalid AG/AT features are flagged automatically by the utility network validation as well.

Gap Analysis

Part of the data modeling process should yield a gap analysis identifying missing configurations in the asset package that need to be added to support all of the objects from the source data. While this is a normal and inevitable part of data migration, the complexities involved with modifying the target utility network are significant. Any changes to the asset group or asset types require rule and network configuration changes as discussed in subsequent sections.

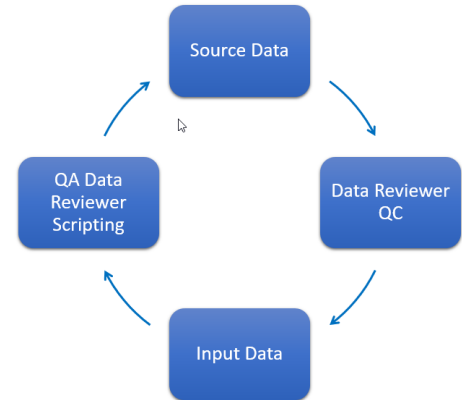
Every effort should be made to map the input data into the target model with the fewest changes to the target utility network. Avoid where at all possible:

- Changing existing AG or AT domain descriptions
- Adding or removing AG/AT values from the domains

- Changing network attribute domains

Data Quality Control and Remediation

Once we understand the requirements that support the mapping of individual features into the utility network data model, we can evaluate the current data against these requirements to determine where remediation needs to occur.



Esri developed a preconfigured solution using ArcGIS Data Reviewer that provides a starting point for this quality control step. The solution configuration provides exhaustive checks on the input data but would have to be configured to include the specific fields and conditions identified in the data modeling step.


An added benefit of having the data mapping document is that it will narrow down the fields that are fundamentally necessary for a successful migration. These are the fields that should be prioritized for cleanup. If a field itself is irrelevant to the migration, why should we spend time fixing it?

A good place to start the QC program is to focus on the fundamental requirements of the utility network and apply them to the incoming data. There are a few hard and fast rules that we can start with:

1. **Data should be snapped.** If migrating from an existing geometric network this may not be an issue, but for non-networked data, topological coincidence should be verified and enforced. Develop a snapping strategy utilizing [snap tool](#) and defining environments with snap rules, ranks, and tolerances to minimize the potential of introducing overlaps into the data.
2. **Line segments cannot self-intersect or have complex geometry.** Data Reviewer does a good job here and is a great way to begin the QC journey. Every time line segments share a vertex (as opposed to an endpoint); an error will be generated in the utility network. Lines that are self-overlapping or are multipart are also not allowed. ArcGIS provides many tools to deal with the errors in this category, including [repair geometry](#), [Multipart To Singlepart](#), [simplify line](#), etc.
3. **Features of the same geometry cannot intersect.** This situation occurs when points features or lines vertexes share the same x,y,z. With regards to lines, this situation is specific to line vertexes. Line segments crossing without sharing a vertex or lines connecting at an endpoint are allowed. Although this configuration is technically not supported in the geometric network, this error is extremely common in many of the datasets we have seen. Evaluate at the

[Pairwise Overlay Toolset](#) for ways to identify these issues within a single feature class and across different feature classes. A common example of this is stacked junctions.

4. **All features in the input data must be mapped to a utility network asset group/asset type.** What this means is that the attribute information identified in the data mapping activity used to translate the feature from the current object type to the target object type in the utility network needs to be validated for accuracy and completeness. This will vary by data model, but the requirements are the same.
5. **Unit records are important.** Some data models rely on unit tables to store object information such as individual anodes at a location or individual capacitor units in a bank. These records will likely be used by the migration workbench to create actual geographic features and connectivity associations, so the unit records are relevant and important. Furthermore, a select set of attributes are mandatory for the migration to be successful and those are the ones that the QC process should focus on. Not all unit records are relevant, but you will need to understand the workbench and target data model to understand which unit record attributes are needed.
6. **Junctions at intersections are required.** Because the utility network is a rule driven system, it is necessary to have junction or device features at every location where two lines features of different types come together.

	<ul style="list-style-type: none">• Snapping the data is important. For many of the issues to be identified in the first place, the data must be coincident. Without snapping, many of the features will not be connected in the utility network OR will not be flagged as overlapping.• Because the electric data model relies heavily on assemblies, features that are currently coincident may be transformed into complex assemblies in the utility network. While this may seem like it will resolve overlaps, be aware that the initial location is often used for the creation of a connection point or line end, thus still causing an error in the output utility network.
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We will revisit other QC tasks as other errors are discovered later in the migration process, but meanwhile these 6 rules are a solid starting point for the QC phase of the deployment. Note that the rules above are domain agnostic. They apply universally to all utility network data structures regardless of specific implementation details. Domain specific validation will occur later in the process. Validation of domain rules are best left to the topology engine within the utility network. There is little benefit at this point trying to recreate that validation using either ArcGIS Data Reviewer or custom scripts.

By evaluating the requirements for the data mapping, you will undoubtedly find additional QC targets that were not identified initially. Examples of this may be the rotation angle field, design pressure field, or nominal voltage fields. These are not critical in mapping the asset group and asset type, but they are identified in the workbench and are necessary for properly migrating the data.

Configuring the input data into the workbench is the first contextualization of the data and going through the schema mapping will provide invaluable insight into the fields needed to successfully migrate the data. These are the fields the QC should focus on.

To get deeper into the data quality we then must get the data into the utility network. Once in the utility network architecture, the topology engine will QC the data and generate errors accordingly. These errors will expose additional QC steps that may be needed before running the full migration.

Migration Tools

With the schema mapping complete and another round of QC, we are now ready to run the data migration workbench using the Data Interoperability extension.

The migration workbench is designed with a set of user-defined variables.

These are accessed through the navigation panel and are also prompted for during execution. These parameters draw together all the sources compiled so far.

Migration Workbench Inputs

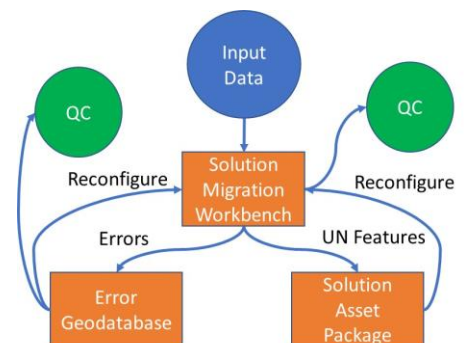
The main user-supplied input to the migration workbench is the source data. Either the full source of the area of interest can be used, but it should already be past the QC stage previously outlined above. The Schema Mapper downloaded as part of the data migration solution and edited as part of the data modeling are fundamental for the successful execution of the migration.

From the solution site you will have the following:

- Migration workbench file
- Schema Mapper
- Assembly XML file (Generally no edits required)
- Domain asset package

Executing the workbench is relatively straightforward, although several iterations are frequently required to get all the data across. Since this is where the various configurations are put into practice, expect some errors on the first several iterations as mistakes in the mapping or configurations are encountered.

The workbench will not only implement the mappings defined in the schema mapper, but test any assumptions made against the input data. You may find input data errors that will require another QC target in the source data and additional cleanup.



Using feature caching and feature inspector functions while troubleshooting will speed the process significantly. Review both the output asset package as well as the redline GDB and error excel file until you are satisfied that the migration was successful. In ArcGIS Pro, visualizing the input data and migrated data in [linked views](#) is the ideal

way to spot check the output. For more information on the workbench be sure to review the [training materials](#) from FME.

Migration Workbench Outputs

Running the migration workbench generates several outputs. The outputs from the workbench will be as follows:

1. A copy of the domain asset package with the source data loaded into it.
2. A redline database containing new or assumed features.
3. An error Excel report of specific input feature errors.

Examination of the excel errors report and the redline features is the first troubleshooting step to ensuring a complete migration. Error features are often caused by misconfigurations in the workbench or attribute errors where the workbench logic was unable to determine how to transform the features. Ideally, they should both have no entries in them.

The asset package containing the successfully migrated data should be evaluated for any of the previously mentioned rules (overlapping features, invalid geometry, etc.) in case the migration process inadvertently created errors.

Invalid mapping of an object to an AG/AT is another important check that should get flagged as an error. A less obvious error is a mis-mapped object assigned an incorrect yet valid AG/AT. An example of this may be a plastic PE main segment source data whose material is accidentally transformed to a main segment of iron. The AG/AT (main/iron) is valid but obviously the mapping is an error.

To evaluate whether the data migrated successfully, check all the following:

- No unexplained errors in the output excel sheet.
- Ensure the redline database features do not need additional post processing.
- Verify that the features in the asset package are going to the expected feature class, asset group and asset type designations. No unknown asset groups or types should exist in the output
- Ensure the domain mapping for material, lifecycle status, and other fields are correct
- Ensure feature associations exist in the C_Associations table

- Ensure subnetwork controllers exist in the C_SubnetworkControllers table

Once these basic checks are completed, we are ready to move to the next phase of the migration which is to build the utility network from the asset package

With the data successfully migrated to the asset package, a series of Esri-provided geoprocessing tools completes the migration by transferring the asset package into an enterprise geodatabase. This is required since a utility network can only be supported inside a database capable of branch versioning and snapshot isolation. The following steps are required to create a utility network from an asset package:

1. Create or enable enterprise geodatabase: *(Must be at version 10.6 or higher)*
2. Create enterprise geodatabase user *(The user cannot have database owner privilege)*
3. Stage asset package *(select portal user that will own the utility network service)*
4. Apply asset package *(load data and calculate statistics)*
5. Enable network topology *(report errors only)*

Validating the utility network

Now that we have a utility network and have validated the migrated data (as described above), we need to evaluate the topology errors in the sample AOI. This crucial step provides data validation within the context of the network configuration. Even with the performed QC outlined earlier in the process, we still may be confronted with thousands of errors that arise from the data once placed within the context of the utility network data model and under the constraints of the rules defined in the network configuration. Don't be disheartened if you have more errors than you expected. Large numbers of errors can often be alleviated with the addition of an additional rule or two or a new step in the QA/QC process.

These errors are essentially the final authority on the success of the migration process. As we review the network topology, we will have to diagnose the cause of the errors and define a solution to resolve them, which may include:

- Redefining the migration data mapping and re-running the migration
- Create / update network topology rules to adhere to the data at hand
- Manually edit features to resolve the errors

Evaluating Topology

Once the sample data is migrated to the asset package, it is time to apply the asset package to the staged utility network. This is also the next step in validating the migrated data and how well it adheres to the network topology rules. The "apply asset package" geoprocessing tool loads the migrated asset package file geodatabase into the staged utility network enterprise geodatabase. Once the asset package has been successfully applied to the staged utility network, you will then proceed to run the "enable network topology" geoprocessing tool with the "only generate errors" option.



- Do not version the staged utility network enterprise geodatabase for topology error validation. This will be done once you are ready to publish your utility network services.
- It is recommended that you initially limit the errors to 10,000 or less

Conceptually, the topology validation provides errors that are fundamentally caused by two types of issues: Errors caused by data and errors caused by configuration. The utility network error features contain the error type and description that will help

categorize the error into one of these two categories. Identifying the correct cause of the error is critical for correctly resolving the issue because the two categories have different resolution paths. Errors that are fundamentally caused by data are resolved in the data, while errors that are caused by misconfiguration are resolved through configuration.

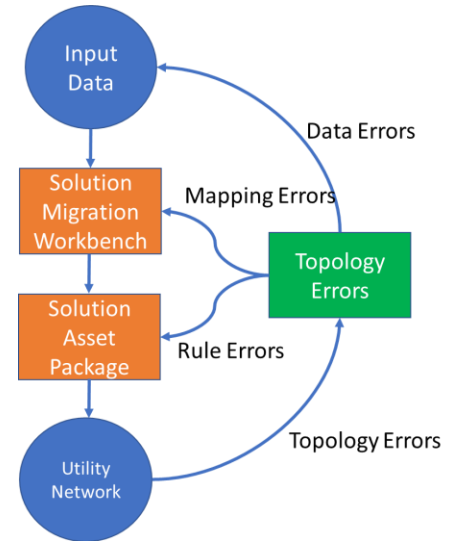
This sounds obvious but understanding this distinction will prevent you from trying to resolve a data issue through configuration. The errors themselves may or may not help you determine which root cause is at play, but we can group all error types into general classes of errors for us to investigate:

- Data Errors: Feature and attribute errors that were missed in the QC process and are now flagged as errors due to rule violation. These errors include codes 4,5,6,7,15,19,20,21,22,23
- Mapping Errors: Translation errors from the translation workbench where input data is miscategorized (possible misconfigurations). These errors usually show up as codes 2, 3, 8, 9, 10, and 36, which are basically saying that a network rule is being violated for some reason. The most common reason is that the object attributes forced them into different AG/AT than what they were supposed to be, and thus do not have a rule to allow it. Carefully evaluate the context the error is in and resist the urge to just modify the rules.

Utility network configuration errors: configurations that are valid in the data that are flagged as errors due to network rules or definitions. These errors usually show up as codes 13, 15, 17, 18, 34, and 35. Again, this may come down to attribute mapping. Another common source for these error types are unique data configurations or relationships in the input data model and not encoded into the default AP. For these errors you will likely need to modify the utility network rules.

The error types listed in the error feature attributes will guide the categorization. A simple frequency on the description will give you a quick overview of your errors. Using frequency analysis or summary statistics, we can get an estimate of the type of errors in the system.


Errors are referenced by GlobalID back to the parent feature, so additional joins are needed to drill down to the offending AG/AT or feature classes. This may or may not be of interest since many non-geometry related rule violations are caused by omissions in the data or rule and not necessarily by the features themselves



If a feature does not have a valid AG/AT, the network does not know what rules to apply to it and will violate every possible rule the system tries to validate against it. Several factors can produce an invalid AG/AT feature as follows:

- Incorrect attributes were used to map the feature from source to target (attribute manager/schema mapper)
- The correct attributes were used but the values in the attributes were missing or invalid (dirty data)
- Attributes and values were valid, but the transformation inserted the wrong value (incorrect transformer or test filter)

As mentioned previously, the total number of errors in the utility network should be as close to 0 as possible. Besides categorizing and fixing errors, you can analyze the errors to calculate error rates for the data. If a 10 percent sample AOI resulted in 200 errors, you can expect 2,000 in the final utility network build. Error counts greater than 10,000 have severe performance and functionality implications.

	<ul style="list-style-type: none"> • For a properly functioning utility network the error count should be as close to 0 as possible. • Error counts greater than 10,000 have severe performance and functionality implications.
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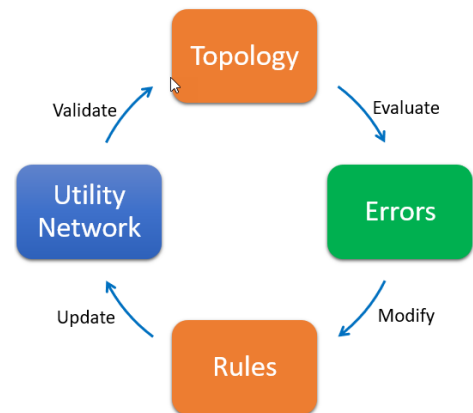
We can resolve many of the identified issues with different strategies. Depending on the most appropriate approach, we have the option of preprocessing the input data, adding transformers in the migration workbench, or adding rules to allow the behavior.

Carefully evaluate each error scenario and potential fixes to determine the best way to resolve them. As mentioned previously, what presents as a missing rule may in fact be a migration mapping error.

Managing Rules

Ideally, all existing features in the input data can be mapped to existing AG/ATs in the utility network. These feature types are defined, and their real-world function and representation should be consistent with the preconfigured rule base. When errors are identified that are due to missing or incomplete rule definitions, the only way to resolve them is by modifying the utility network configurations. When trying to resolve errors by reconfiguring the utility network, the iterative process for modifying networks follows these general steps:

1. Validate the network on the AOI with the option to “only generate errors”. This should complete quickly and display the topology errors.
2. Evaluate the errors to determine a pattern and cause. Use frequency to determine if this is a common issue or just a random data error
3. Create or modify rules to allow the behavior either using a template (see below) or adding an individual rule
4. Update the network with the rule changes and other necessary configurations (such as edge connectivity or tier definitions)
5. Re-validate the topology



In the case where an entire feature AG/AT is missing in the utility network, the change will require significant modifications to the utility network rules. This task

should not be taken lightly. When adding a new AG/AT, every single connectivity, containment, and association rule must be defined as well.

Consider the following case: A new type of fiberglass lid for underground enclosures has been developed and approved for use in the organization. While the utility network has an asset group called "lid" in the structure junction feature class, the available asset types are only concrete and metal. Adding a new fiberglass asset type is required, following these steps:

1. Add the new asset type. Asset types are defined by a domain. Open the subtypes view of the structure junction feature class and locate the "lid" subtype (aka asset group). The asset type field will list the domain assigned to that field for that AG. Open the domains view and edit that domain by adding a "fiberglass" AT.
2. Now that the domain value is added, rules must be defined. The quickest way to get this done is to start from a template. If the new asset type is like an existing feature, it is better to gather the existing rules that define the network behavior for that feature and use them as a starting point. All rules can be exported using the [GP tool](#). Once the rules are exported, filter the list to only show the rules for the template feature.
3. Copy these rules to a new .csv and replace the AT code of the template feature to the AT code we just created. Edit these rules as needed to define the desired behavior for your new AT.
4. Append these rules back into the utility network using the [GP tool](#).

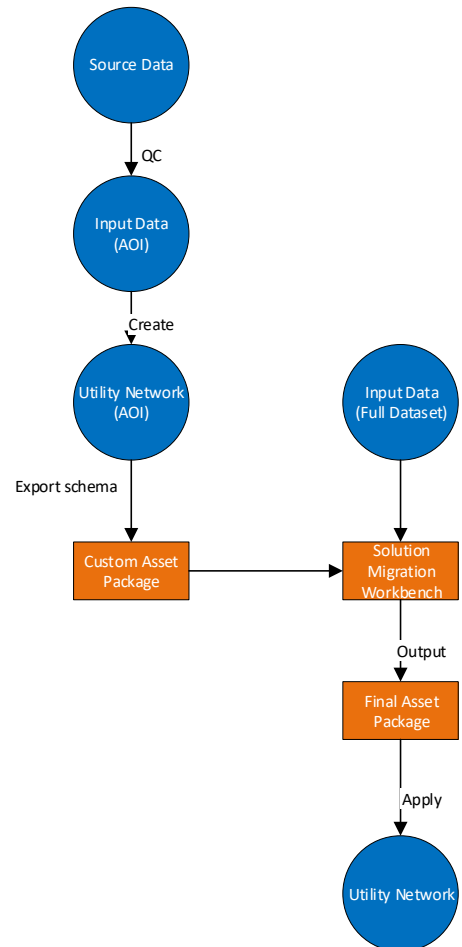
The solutions team created a nice [GP toolbox](#) that helps with this task. The tool will read the utility network rules and instead of exporting all the rules as a .csv, it will create an excel spreadsheet for you to visualize the rules. Moreover, editing the spreadsheet will allow you to generate the new rules for import into the utility network. This tool is available on GitHub for download. If severe modifications to the rule base are needed, this is a much better method for managing the rules.

Finalizing the Migration

Once the utility network that is built against the AOI is complete and the topology is validating with an acceptable level of errors (usually the intrinsic error rate that is attributed to bad data), the entire data migration process should be re-factored to run against the whole dataset and build the full utility network. To do this, the following steps are required.

Re-Factor the migration process:

1. Export the AOI utility network asset package using the Export Asset Package tool. This tool will take all the configuration changes you made to the utility network during the topology validation phase and create a new asset package based on those changes. Any rule modifications, configuration changes, etc. are exported for use in the next iteration
2. Modify the data migration workbench to use the updated asset package from the previous step. Also change the input feature classes to reference the full source data.
3. Re-run the migration workbench. Check the log and the error GDB. You should not have any unexpected error features. The same steps used to create the AOI utility network will be taken again, this time with the full dataset.
4. Build a new utility network and apply the asset package.

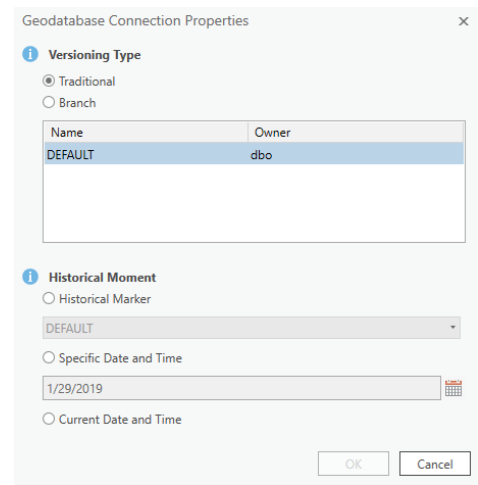


With the data successfully loaded in the utility network, the final phase of the implementation is to complete the configurations to enable the advanced network functionality and analysis. To do this, the data must be prepared for publication to Portal and shared with the end users.

Enable branch versioning

Branch versioning which was introduced at 10.6 is the mechanism behind long transactions for services. The utility network can only be edited through branch versioned services. To enable branch versioning, the dataset must have both editor tracking enabled and GlobalIDs on each feature class in the dataset.

To register the data as branch versioned, the versioning type in the database connection file needs to be set to branch BEFORE the register as versioned command is executed.



Once registered as branch versioned, the data cannot be edited except through services

Publish utility network service

Publish the utility network service by adding all the utility network layers and related tables into an ArcGIS Pro map. To publish the service and enable the utility network extension on the service remember the following:

- All utility network feature classes must be present in the map.
- All fields in the utility network feature classes should be visible.
- Layers from the utility network feature classes cannot contain any definition queries.
- All layers in the map must be branch versioned.

Only the Portal user who created the utility network can publish the service. This user will need to be logged in to Portal to complete the sharing of the service with the users.

Enable Network Topology

Network topology is enabled using the same tool used previously to generate the topology errors in the AOI utility network. The difference in this run is that we will not enable the “only generate errors” option. This will enable the network. The functions available at this point include the following:

- Intelligent snapping
- Validate network topology
- Network tracing

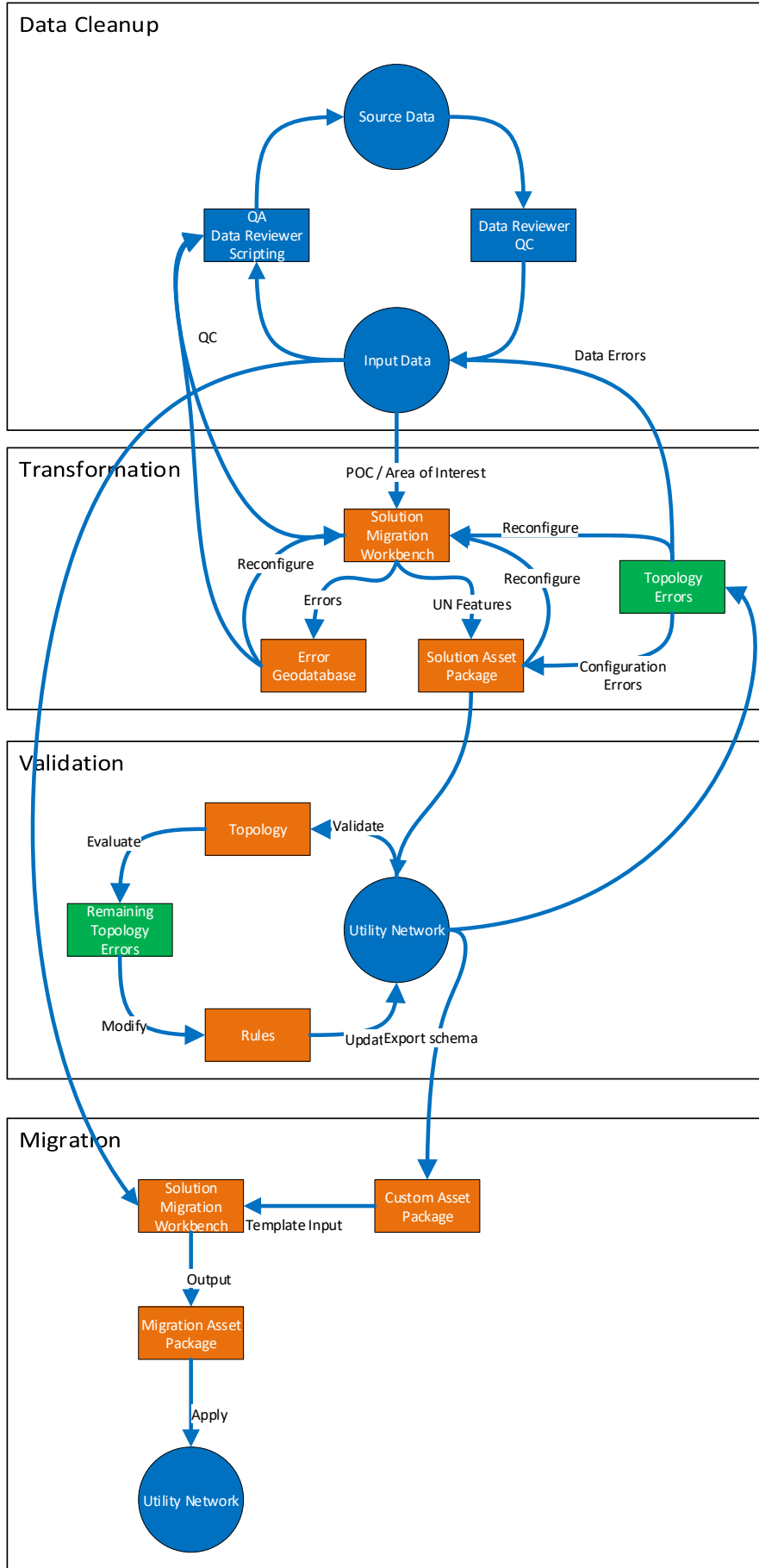
Execute the tool from ArcGIS Pro either using the service or directly against the database.

Update Subnetworks

Updating subnetworks can only occur once the network topology is enabled. This tool can be run immediately after enabling topology. This tool must be run against the utility network service.

In Conclusion

The utility network data migration is only one aspect of a multi-faceted process of moving to the utility network. For a successful migration, transforming the data is the fundamental first step in this process. As you can see from the complete workflow diagram below, the migration does follow logical process in a non-linear flow. With proper prior planning and the structured methodology outlined in this white paper, the migration process is understandable, and the resulting data will provide a solid foundation for the subsequent phases of the utility network deployment.

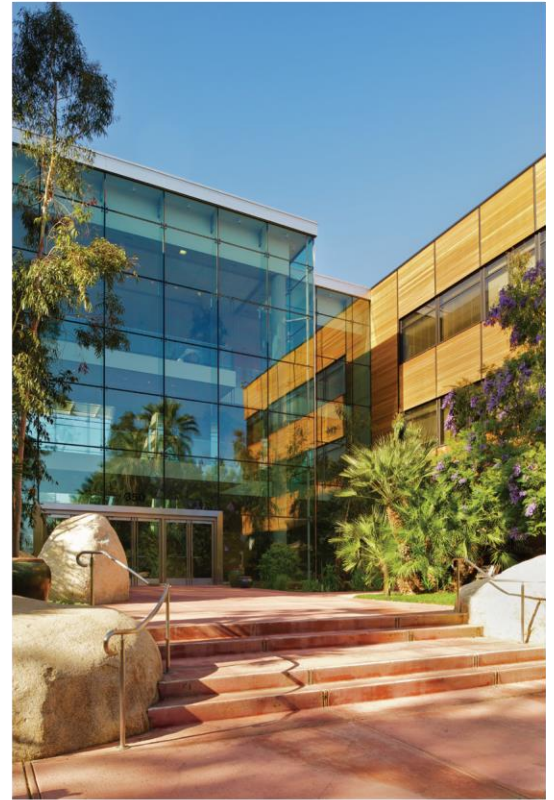




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