Esri Water
CONFERENCE 2016

ArcGIS Road Map for Utilities

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Utility Roadmap

Setup Portal for your organization

Move to ArcGIS for Desktop 10.2.1

Make use of ArcGIS for Utilities

Move to the Utility Network

A little further down the road

Stay on top of platform improvements/GeoEnable your organization

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Improving ArcGIS 10.2.1

- Strategic improvements and bug fixes
- Utilities and Telecom Update 1 Patch – August, 2014
- Utilities and Telecom Update 2 Patch – February, 2015
- Utilities and Telecom Update 3 Patch – May, 2015
- Utilities and Telecom Update 4 Patch – October, 2015
- Utilities and Telecom Update 5 Patch – almost done
- Utilities and Telecom Update 6 Patch – 3 to 4 months from now

Continuing Support for ArcGIS 10.2.1

- Extending support an additional 2 years (through June, 2021)
  - Just for utilities and telecoms, will not be noted on support page
- Support for Windows 10 and Windows Server 2012 R2 Update
  - Big effort, waiting for demand
Introducing the Network Management Project

Vision:

• Provide utility customers with the ability to model, edit, and analyze complex networks of facility infrastructure using all Esri platform clients.
• Enable key modeling concepts to better support a true representation of what is on the ground, while fostering an easy exchange of network information with other mission critical systems.
• Support highly responsive editing and analysis capabilities.

Network functionality everywhere

Portal

Sync

Mobile Apps

Desktop

Devices

Web
Introducing the Network Management Project

• New model to support utilities and telcos for the next 10-15 years
  • Electric, gas, water, wastewater, sewer, and telco

• Goals of the project:
  • Improve overall performance and scalability
  • Improve ArcGIS platform interoperability
  • Reduce cost of ownership
  • Improve efficiency and productivity
  • Improve data quality
Network Management Project Key Differentiators

- Cross platform support
- Services based architecture
- Updated network model
  - Data models
  - Source management
  - Connectivity associations
  - Containment associations
  - Structural attachments
  - Multiple terminals
  - Built in support for network diagrams
  - Robust tracing capabilities
  - Validation
  - Export capabilities
- Updated transaction model
  - Based on change tracking model
  - More flexible, less overhead
- Field expressions
  - Cross platform scripting capabilities
  - Scripts execute as features are updated
- Enhanced editing experience
  - Expanded feature template model
  - Snapping based on connectivity rules
- Composite map layers
- Central storage of maps and projects

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Utility Network - Overview

• From an information model perspective, the utility network is a collection of domain specific networks that support:
  • Tracing across networks (e.g., between distribution and transmission)
  • Sharing a common structure network (e.g., cable and water distribution)

• All utility networks contain a shared structure network and one or more domain networks

• Domain networks share:
  • A similar table structure and core capabilities
  • A common network index and collection of dirty areas, point and line errors, and network diagrams
Conceptually, the utility network is composed of one or more networks:

- Each domain has a collection of networks (e.g., in electric domain: transmission, distribution, and structural; the gas and water domains also include cathodic protection).
- An organization determines which of the networks is relevant for their business (e.g., some will not manage or maintain transmission, only distribution, or vice versa).

### Electric network
- Transmission network
- Distribution network
- Structural network

### Water network
- Transmission network
- Distribution network
- Structural network
- Cathodic protection network
Network Index

• Within each utility network (a set of domain networks), there is one network index.

• The network index stores connectivity, containment, and attachment information used by the utility network to facilitate fast network traversal/analytical operations.

• Differing from the existing logical network, it provides support for:
  • Global ids
  • Containment and attachment associations
  • Variable length attributes/weights (including strings)
  • Dynamic attributes (including real-time)

• The editing model it supports also differs in that changes in feature space are not immediately propagated:
  • Feature edits are tracked via dirty areas; updating the index maintains consistency.
  • End users decide when to update the index based on their workflows.
Data Models

• The domain specific data models will simplify the development of advanced applications and solutions by business partners and Esri

• The common core helps reduce long term costs by ensuring that:
  • All utilities can utilize tools provided to the community as solutions
  • All utilities benefit from future enhancements
Connectivity Associations

• Utility Networks support connectivity based on x, y, and z coincidence. In addition, non-coincident features can also be connected.

• Connectivity associations are used to model connectivity between two devices that are not necessarily geometrically coincident.

• A connectivity association can only be defined between two point features:
  • Connectivity rules limit what can be connected between two junctions/terminals.
  • Connectivity associations are only supported on DistributionDevice, TransmissionDevice, and MiscJunction classes.
  • No connectivity associations to end points of lines.
Containment Associations

- Containment is used to model the association between devices and structures where the device is “contained” in the structure
  - E.g., a valve inside a pump station
- Only structures and assemblies can be containers
  - Devices cannot be containers, only content
- Structures and assemblies can be content
  - Lots of things can reside in a pump station
- Containment associations can be supported on point and line features
  - Polygon containment will be supported in the future
Terminals - Overview

• A terminal is a logical connection point on a device

• Terminals support more realistic modeling of devices
  • Important for CIM as well as sophisticated analytics without data extraction

• Terminals allow a device to be mapped to a collection of junction and edge elements in the network index

• Terminals are defined for certain devices; not all devices need to support terminals
  • Devices that require a high and low side for analytic purposes
  • Devices whose traversal is asymmetric
  • Devices that require valences larger than two
Terminals – Example Configurations

• Needed mostly in the electric and telco domains
• The utility network will support at most five terminals on a device
Terminals – User Cases

• City of Geneva

- Tri-state switching
  - A, B, Nothing

A

B

Terminals – User Cases

- Connectivity associations
- Lines into devices
- Connection Points
- Switches

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Terminals – Use Cases

• T-blade switches are four-position sectionalizing loadbreaks
  • They have three terminals and four configurations

• Allowable configurations (enabled edges):
  • ABC: edge 1, edge 2, edge 3
  • AB: edge 1, edge 2
  • BC: edge 2, edge 3
  • AC: edge 1, edge 3
Source Management

- Sources are the origin of resources flowing through the network
  - Sources have a name and are associated with subnetwork instances; as such, the source is also associated with a type (e.g., radial, mesh) as well as a network (e.g., Transmission, Distribution, or Structure)

- Source name is used in the information model to identify the source
  - Source names commonly correspond to the assigned name of the pump station or other source

- Source names are used for:
  - Labeling/annotation, map making
  - Assigning units of work
  - Visualization (circuit map)
  - Exporting portions of the network
Lifecycle Management

- Life cycle status will be an attribute on the features (enforced via a domain)

- The system will come preconfigured with four life cycle statuses
  - Proposed, in-service, abandoned, and under construction
  - The system will be extensible and allow users to specify up to four additional life cycle statuses

- Life cycle status will be persisted inside the network index

- Trace operations will allow users to constrain results to respect life cycle state
  - Life cycle status can be used to control traversability
  - By default, it will use in-service
Analysis

- Analysis (tracing) is exposed in Pro as commands, as GP tools, through the managed SDK, and as REST endpoints in the Utility Network Analyst service.
Network Diagrams

• Integrated mechanism for utility network users to work with diagrams
• Comes with pre-configured schematic diagramming capabilities
• Default diagramming capabilities can be expanded to create simplified/enriched diagrams
• Comes with a collection of layout algorithms to lay out diagrams content
• Users can control diagram persistence
• Diagram owners can control access rights on persisted diagrams
Validation

- Validation of data models in the utility network is similar to topology validation.
- The utility network information model will facilitate the specification of connectivity, containment, and attachment rules as part of the data model.
- Rules are validated through a process that is decoupled from the index update process.
  - E.g., validate network (which consumes dirty areas, etc.).
- When features violate the specified rules, error features are created.
- The user experience for discovery and inspection of errors is similar to ArcGIS topology.
  - Errors will be persisted in system maintained error tables at the workspace level.
  - These error tables will be shared across the system.
Transaction Model

• Making use of non-versioned archiving model introduced with the Sync model
  • User experience same as with current versioning model
• Three primary workflows will be supported:
  • Short transaction connected to the Feature and Utility Analyst services
  • Feature service with sync for local editing (Pro or Runtime)
  • High isolation connected through Feature service
• Benefits of non-versioned archiving approach:
  • No need to reconcile/compress nightly
  • Performance – well performing and scalable database queries
  • Temporal properties – history capabilities built-in, future support for partial posting and possibly parallel posting
Field Expressions

• Configurable field expressions will be exposed for the purpose of automatically populating field values for features
  • e.g., [fieldA] = [fieldB] + "::" + [fieldC]

• Field expressions are logically constrained

• Field expressions:
  • Will overwrite values already present in the field
  • Are applied when a feature is created, updated, or deleted
  • Are associate with a class on a subtype basis
  • May not modify system-maintained fields
  • Are part of the workspace and may be shared
• The editing team is defining their requirements for being able to store editing templates in the data source (e.g., the Geodatabase catalog); this includes
  • Defining what a template’s definition is
  • Defining access requirements across the platform
• Adding Stamp Template option for repeatable configurations
• Including ability to define all containment, connectivity and structural attachment associations during feature creation
• Snapping based on defined connectivity rules
Demo – Utility Network in ArcGIS Pro
Continuing the Growth of the Platform

Information Technology

Foundation Apps and Essential Information Products for Rapid ROI

Leverage services, API’s, SDK’s to geo-enable ERP, BI, WMS, CRM

Corporate Authoritative “GIS Network” Data

Operational Technology

Extended / Custom Apps for Advanced Workflows

Leverage CIM, GeoEvent, etc. to geo-enable DMS, OMS, AMI, SCADA

Commercial Content

Utility Network
Transaction Model
Editing Tools
Field Expressions

Desktop
Web
Device

Server
Online Content and Services

... Extending network capabilities throughout the platform
Your input in our surveys enable us to maintain high standards in our sessions.

Download the Esri Events app and find your event.

Select the session you attended:
- Breakfast
- Registration
- Data Health Check
- Hands-On Learning Lab
- User Presentation
- Technical Workshop
- Hands-On Learning Lab

Select “User Presentation Survey” or “Technical Workshop Survey”

Complete Answers and Select “Submit”

Creating a Mobile Presence
Wed Feb 10 8:30 AM - 10:00 AM
Meeting Room 4/5
Enterprise | User Presentation

Toni Jackson
SAWSW

In the age of cell phones customers want more access to information available on their phones. San Antonio Water System is moving into the mobile world with their first application. The app will show users Capital Improvement Projects that have been budgeted and scheduled on a map.