

SPATIALnet™

Features Capability Summary

The data-ready SPATIALnet solution provides powerful and flexible facilities maintenance capabilities via its network modeling and maintenance modules.

The detailed records representing Outside Plant have a significant influence on a Network Manager's ability to provide new services to its customers.

SPATIALnet provides the tools necessary to allow these records to be fully maintained. In addition to recording the current state of the built network, it also supports designing the future network right in the same database.

This approach ensures that the very latest information about the current and proposed state of a network is available to relevant personnel at all times.

Past Problems Solved

SPATIALnet resolve many problems of the past. SPATIALnet:

- is pro-active rather than re-active, being a fundamental planning and design tool rather than simply a recording tool after the event
- integrates with overall Job Management and Workflow processes which define, build and manage the Outside Plant network
- is highly configurable and allows definition of an almost unlimited range of business rules, or the introduction of radically new capabilities, without the need to change the base architecture, and without impacting the solid core of base functionality
- supports a fully connected network with built-in integrity, ensuring only valid network relationships are allowed to exist for installed data - this allows for a range of high performance network trace options to be configured and interfaced to various other specialized applications
- allows production of traditional paper style output, or state-of-the-art web publishing and reporting facilities to ensure that authorized staff across the enterprise have access to key network or network-based data.

SPATIALnet – Design Assistance

SPATIALnet provides the user with the necessary tools to create and maintain a detailed model of the network.

This model incorporates all relevant attributes and relationships including spatial location, containment and connectivity.

Many Designers think in terms of end results rather than the multitude of steps involved along the way.

SPATIALnet supports this natural approach by building implied infrastructure intuitively wherever possible, rather than inflexibly forcing each to occur in a pre-defined sequence.

SPATIALnet offers design help and solutions rather than just errors or warnings.

Designers are human and mistakes are inevitable. SPATIALnet allows edits to be undone, while still maintaining the integrity of the network changes that remain.

Designers may also change their minds or wish to try alternate solutions.

SPATIALnet allows multiple design scenarios to be generated and stored in the RDBMS, with all but one being discarded prior to publishing.

Facilities Management

Area Selection and Presentation

Access to an area of interest can be gained through a wide range of options, including plant id, address, coordinate, named polygon.

In general terms, the network data within a selected area is usually presented against a backdrop of spatial context data such as cadastre graphics in vector or raster form, or some other form of raster such as aerial photographs which have been correctly registered in a spatial context.

An area of interest can be presented as a Single Line Network Path Map, which shows the location of network plant in relation to other geographic features.

The features include street and property boundaries, street centerlines, waterways and locations of cultural and historic significance. This ensures that plant items can be readily located by their spatial context.

Alternately, a presentation may take the form of a schematic such as a geoschematic where each cable for example is represented as a separate line, offset for readability from the actual path followed by the cable.

The presentation content of a viewed area is completely configurable and once a view has been created, the user can control all aspects of content, via use of filtering, and extent via the use of zoom and pan options.

The presentation style will be configured to closely match the Network Manager's standard drafting conventions. This will ensure that existing staff involved in view-only activities with the network data will require no additional training. They will be able to use their existing map reading skills.

A precise definition of required display conventions will be generated in consultation with the Network Manager during an initial Requirements Analysis and System Specification Stage at the start of a SPATIALnet implementation project.

Network Query Operations

SPATIALnet's "General Network Query" function allows the user to select any network graphic and report details relating to the network entity or entities which the graphic represents.

For example, a query on a pole will report detail of the pole attributes and report on any cables and equipment mounted on that pole, retrieved from the RDBMS.

Network Editing

Access to network data, for the purpose of capture and edit, is provided as a set of functions providing a "point and click" interface to the plant map in question. This is coupled with a "forms style" view of the attribute details of selected plant items.

All edits to network data take place in the context of other existing connected or associated plant. The system supports the Designer by allowing evolutionary refinement of detail as the design is developed.

SPATIALnet does not enforce strict rules until the Designer indicates completion of a section of work. The design is then fully validated against carefully specified rules to ensure that the design is compliant.

Edit functions provided by SPATIALnet correspond to real world actions that take place.

For example, constructing and modifying Equipment and Cable Housings, hauling and connecting Cables and installing and terminating Equipment. This approach ensures SPATIALnet is easy to learn and use.

All actions can have a status of either "Correction" or "Design". In "Correction" mode, any changes are considered to be changes that, when made, will reflect the current state of the network.

In "Design" mode, changes are considered to be to the proposed state of the network. All changes made in a "Design" context can be identified and exported for evaluation by an external estimating process.

Network Add Operations

SPATIALnet's "Add" functionality allows the initial capture of network entities.

SPATIALnet functionality includes the following:

- all new entities will be allocated a system wide unique identifier
- a predefined set of attributes can be captured for each entity class and sub-class
- the validity of each entered value can be checked against predefined criteria
- spatial data such as coordinates or inferred spatial data such as "in a given Housing" is captured and recorded
- relationships with other network entities are either directly captured or inferred during the capture process
- any specific display requirements such as layout or special presentation formats may be defined
- overall attribute combination and context data can be verified using predefined rules

Network Edit Operations

SPATIALnet's "Edit" functionality supports the modification of network entities including the following:

- a predefined set of attributes can be edited for each entity class and sub-class
- the validity of each entered value can be checked against predefined criteria
- relationships with certain classes of network entity may be modified
- specific display requirements such as layout or special presentation formats may be updated
- overall attribute combination and context data can be verified using predefined rules

Network Delete Operations

SPATIALnet's "Delete" functionality allows the deletion or retiring of network entities.

Entities will be deleted if the action takes place in a "Correction" context, or retired if the action takes place in a "Design" context. Entities that are retired may be retired "in place" or "removed".

Plant, which is retired in place, may be retained in the database for reference. Such plant has no other network significance.

Network entities involved in delete actions perform appropriate rule checks to ensure that network integrity is maintained.

For example, no equipment requiring support will be left unsupported, no cables requiring connections will be left unconnected, and so on.

Other Specialized Actions

SPATIAL_{net} supports a range of specialized verbs such as Insert, Attach, Detach, Transfer, Cut, Extend, Move, Reinstate, Join, and so on.

These verbs apply to those classes for which they are applicable. SPATIAL_{net} is readily extensible, allowing new rules, actions and qualifiers to be defined using the associated configuration tool.

Network Connectivity

Model Relationships

SPATIAL_{net} provides an industry-specific data-ready, fully configurable, interconnected network model template.

The connectivity of the network is modeled at both the infrastructure level, the cable level, and at the individual circuit level.

At the infrastructure level, connectivity is maintained between the various components, for example Manholes and any interconnecting Trenches or Conduits and Poles and any associated Aerial Spans.

At the Cable level for example, connectivity is maintained between the various equipment components, cross-connecting devices and the cables or fibers which distribute the power between them.

Network Tracing and Reporting

SPATIAL_{net} provides a powerful and flexible tracing engine, which is designed to work with the implemented datamodel.

The trace engine can be:

- configured to “walk” specified connection relationships
- constrained to trace towards the customer, towards the exchange for example, or both directions
- configured to stop at user defined boundary conditions such as particular equipment types

The trace collects all involved devices and connections that it finds into a database result set, as it traverses the trace path.

The results of the trace can be presented as a:

- highlighted path on screen within the plant map
- written report available for printing
- result set within the database used for report generation or other data manipulation

When a result set within the database is captured, it can be fed into a wide range of secondary processing options to produce output in any other form required.

These include:

- reports of affected services
- export to network analysis programs
- reports on plant in service, or
- automatically generated form-letters to customers

Network Modeling and Configuration

SPATIAL_{net} offers a rich set of concepts for use in defining, presenting and interacting with complex network models.

SPATIAL_{net} provides the Configurer with parametric controls for all aspects of an entity’s model definition, user interface and behaviors.

At its core, SPATIAL_{net} is a general-purpose data modeler. It exists as an object-oriented modeling framework built around a generic library of foundation classes, referred to as the “SPATIAL_{net} Base Classes”.

These base classes model the structure and functionality associated with generic components of a spatially distributed network.

By adding to and customizing the generic model, SPATIAL_{net} can be configured to represent the most complex of spatial networks.

Configuration within SPATIAL_{net} is achieved via its accompanying data modeler, SPATIAL_{modeler}. The object model contains all details relating to the set of entities being modeled, their attributes, relationship behaviors including business rules, and desired presentation characteristics.

SPATIAL_{modeler} also contains configuration information for abstract classes, which control the behaviour of application functions applying across multiple entity classes.

Examples include Area Selection, View Definition, Network Tracing and Job Management.

A Network Manager’s system will be configured out of the rich set of network-aware base classes, which can provide a wide range of behaviors mapping neatly against stated requirements.

SPATIAL_{modeler} operates in conjunction with Rational Software’s “Rational Rose” product. Rational Rose provides a state-of-the-art modeling interface and uses the industry standard Universal Modeling Language (UML).

Integrated Work Design

In a Network Management organization, there is a constant need to update or improve data. It is crucial that appropriate job control and quality assurance methods be applied to this process.

The SPATIAL_{net} Job Management System (JMS) supports such a "change management" control process.

JMS provides tools that allow areas of data to come under change management control for a particular project or job, without impacting the master database. After changes have been made and approved, the necessary tools are available to publish and post the data to the master database.

Under the control of JMS, all proposed changes are confined to copies of network elements.

Such changes are only made public (published) upon request (for example, after approval). When work for the proposed changes has been executed, the data is fully merged (posted) into the master database.

The JMS approach to job management has a number of advantages:

- the master database can be write-protected from all users except the supervisor if necessary in order to fully support the Network Manager's QA process
- updates can be performed on remote machines if necessary and the amount of data to be sent to the master machine is minimised
- simultaneous access is available to the same geographic area for multiple users
- conflicts during modification of the same plant by multiple users can be resolved
- alternate proposals for the same area of data can be developed (with ultimately one proposal being published)
- proposals remain private until the Designer has completed a design – for example, once a design is approved, it can be published for use by other Designers

A primary concern with the application of JMS functionality is to ensure a good fit within the workflow of an organization.

JMS is designed to operate in conjunction with the SPATIAL_{net} suite of modules to support full integration of JMS functionality into the SPATIAL_{net} application.

It is imperative that the integrity of the master dataset be protected at all times. This is normally achieved by introducing a set of quality assurance procedures and a version control system for the data.

JMS provides the necessary tools and check points to support this approach and to establish it as the normal and most effective way to do business.

The major functional components of JMS are:

- Create job (with optional nomination of job area boundary)
- Edit or Add network items within a job (development of design proposals)
- Undo edits
- Publish proposals
- Job-on-job operation
- Cancel proposals (Cancel job)
- Install proposals (Post job)

Other options available include:

- Partial Publish
- Partial Post
- Transfer plant
- Merge jobs
- Split job

These options can be supplied for advanced applications.

Further Details

SPATIAL_{net} offers a wide range of capabilities.

Refer to the SPATIAL_{net} Features Matrix for more detailed information.

For more information

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