Company: RoboComAI Network Visualizer
Technology: Nevron Vision for .NET

"Nevron diagram and charting components superseded rival products in terms of features, cohesion between products, ease of integration, agile performance, quality, and dedicated technical support."

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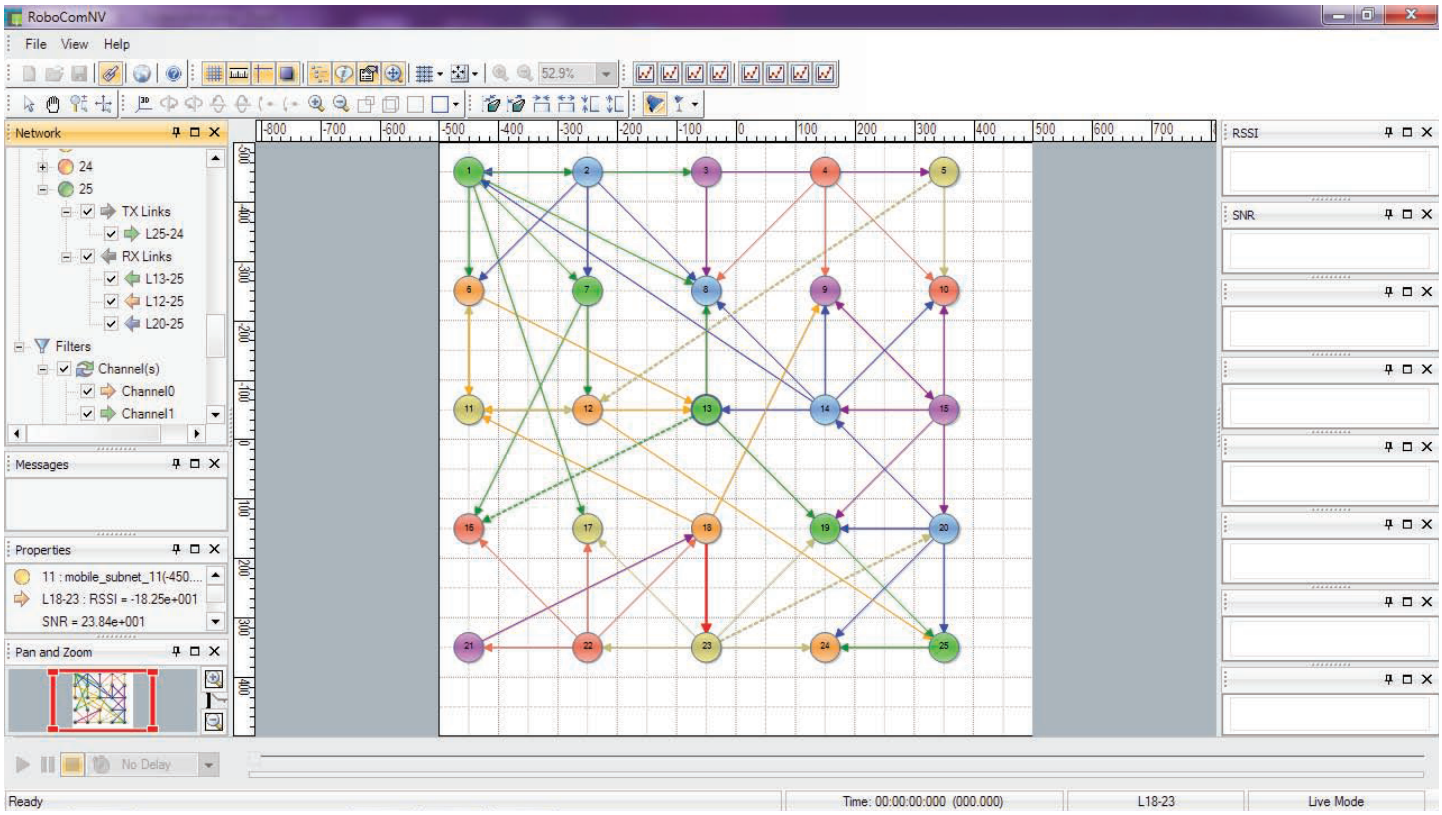
Intro

RoboComAI creates robust communication networks by providing advanced wireless networking engineering services and channel access software. Our leading-edge wireless networking software design, development, modeling, simulation and analysis enables robust networked communications in tactical and airborne test environments.



Project

Our primary mission is the developing communications systems and algorithms. To support this effort, we have developed several non-commercial internal visualization tools used by RoboComAI engineers in performing engineering development activities. One such visualization tool we have developed is the RoboComAI Network Visualizer, or RoboComNV for short. RoboComNV is a fat client tool used by engineers in the development of network based applications.

RoboComNV provides network operators and analysts the capability to monitor the performance and status of a wireless network system in real-time or in playback mode based on previously recorded network activities. The tool facilitates presentation of network performance related to node connectivity, network connectivity, and traffic throughput, and latency information in a visual form to aid in the analysis and maintenance of deployed wireless network systems.

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The RoboComNV network visualization tool can be adapted and used as a baseline model for a network monitoring and visualization solution to realize some of the capabilities expected of the proposed effort. RoboComNV is driven with content over a network connection from an external data source. This data sources will include communication models using tools such as OPNET Modeler and MATLAB, customized software running on desktops, or embedded systems running on custom hardware. Having a common output visualization tool allows for measuring output from what can be very disparate hardware platforms and operating systems.

Requirements Scenario

The requirements of the RoboComNV project was to develop an application presenting a two dimensional spatial diagram of communications nodes with communications links between them, a series of line charts providing various communications related data, and a network tree view allowing the user to specific the visibility of communications link or groups of links. Communication systems typically require multiple operating frequencies or channels, or frequency agility. To aid in visualizing determining the active channel for a link, we required a tool set where we could associate a color with a particular operating channel, or the channel that a communications node was actively using. When viewing network communications between a large numbers of connected nodes, it is often necessary to filter what is displayed to a particular network node, a particular channel frequency, or a particular user defined group of nodes. A network tree was then required to provide the visual filtering based on operator selections.

The application required synchronization between these three major panes such that the selection of a communications node or link in one pane selects the corresponding signal in each of the three major UI panes. For example, when the user selects a communications node or link in the diagram pane, the corresponding signal is highlighted in the network tree or in the line charts.

Communication nodes are frequently mobile, and we therefore required a tool where a communications node could be moved in the diagram view while the communications link would automatically adapt to the changed node position of the link end point. We also required that the diagram view allow for providing a map background from an external image file.

RoboComNV supports both a live link mode of operation as well as playback mode. Playback mode is particular useful to replaying a previously recorded analysis, or for providing the ability of an end user to view results who does not have access to the original data source. By using RoboComNV, the end user does not have to purchase and license a heavy weight application like OPNET or MATLAB on his/her desktop to view communications results.

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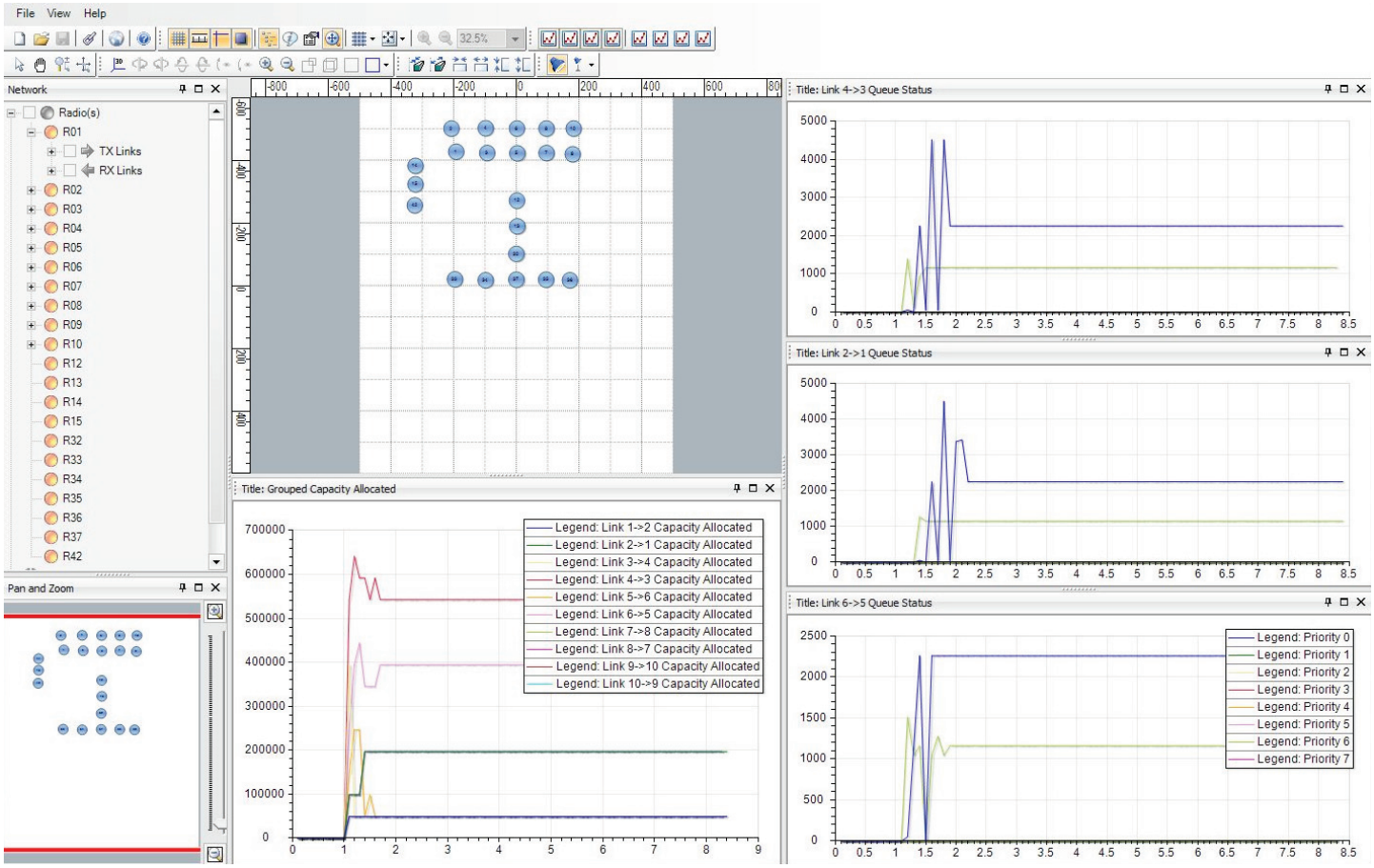
Solution Implementation

The implementation of RoboComNV required combining the Winform based Nevron Diagram for .NET with Nevron Chart for .NET along with standard Windows user interface components. Application code was developed to synchronize selections made in the primary panes (network tree, diagram view, and charts). In additional, the RoboComNV user interface provides a message pane which allows the sending application to generate free form messages for display. The RoboComNV user interface also provides a properties pane, which allows the operator to select a property of a particular communications node or link (such as signal to noise ratios, received signal strength, etc.) and snapshot that setting for display in the properties pane.

When developing communications based applications to drive RoboComNV with content, it became apparent that a large range of line charts were required which exceeded the 8 charts provided in the



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user interface for the simultaneous display of content. Therefore, in RoboComNV, the application maintains an internal database of chart data that it receives from the sending application, and the user has the ability to subscribe to a particular set of data from a context menu for each chart. Exporting chart data to Excel is also provided in the chart context menu.

Reason to choose Nevron controls

Nevron was unique in the breath of their product offerings, and the importance of finding a single vendor who provided both a diagram component along with a chart component, as we require synchronization between them. Getting both components from one vendor ensures a uniform architecture and that our goals of implementing synchronization between them could be accomplished with less development time than when trying to integrate components from different vendors.

Benefits

Nevron diagram and charting components superseded rival products in terms of features, cohesion between products, ease of integration, agile performance, quality, and dedicated technical support.

Solution highlights

The development time for RoboComNV was 5 months for one developer, the development and deployment platform is Windows. RoboComNV is a fat client application, using an internal memory based proprietary database for storing chart data for display. RoboComNV uses a proprietary binary storage format for persisting live session data for playback.

Project industry: Communications Development
Project type: Fat Client Network Visualization for Engineering Development

RoboComNV displays content of data originating from a data source over a network connection. As such, it does not inherently have data to display, and is generalized to display content as specified from an external source. RoboComNV is capable of displaying a wealth of different information associated with nodes, connections between nodes, and chart line data.

Bob O'Neil
RoboComAI LLC
www.robocomai.com