

CAPABILITY BRIEF

Connex Anywhere

WORLD'S FIRST SOFTWARE FRAMEWORK DESIGNED TO ENABLE RAPID DEVELOPMENT OF GEOGRAPHICALLY-DISTRIBUTED REAL-TIME APPLICATIONS

HIGHLIGHTS

Communicate over mobile networks, wide area networks (WANs), as well as local area networks (LANs)

Transport-independent DDS-compliant APIs

Low-latency, high-throughput, reliable and secure communication

Automatic discovery and peer-to-peer connectivity without multicast and across NATs

Tools to accelerate design, development, testing and integration

How do you create applications that can exchange information in a reliable, secure and performant way over WAN and mobile links? RTI Connex[®] Anywhere enables faster time-to-market for applications that require high-fidelity real-time communication over diverse mobile, wide area and public networks.

In today's age of connected devices, many companies are making the move from selling products to selling Capability-as-a-Service. Concepts such as Remote Operations and Remote Diagnostics are enabling companies to guarantee improved outcomes for their customers, directly delivering the value they are looking for by minimizing potential service downtime and monitoring deployed products more closely.

However, successfully operating a Capability-as-a-Service model requires the ability to access application data and monitor product usage over WAN and public LAN links – and these links can be unreliable, intermittent and unpredictable at the best of times. The challenge is finding a way to achieve split-second connectivity over these remote or mobile networks – both to enable critical remote management functionality, as well as achieve faster time to market for new Capability-as-a-Service applications.

As companies increasingly pursue globalization of operations, gaining the technological flexibility to communicate anywhere and anytime – over different architectures – can lay the foundation for important new features, such as transferring data to the cloud from real-time systems and using advanced

algorithms to deliver intelligence. The capability to extend the datacenter to the WAN represents an operational transformation that can mean the difference between success and failure in competitive new markets.

Therefore, a solution is needed that can also provide a foundation for leveraging enabling concepts such as software-defined networking (SDN) or software-defined wide area networking (SD-WAN), as well as emerging technologies such as 5G, to accelerate application development.



MANAGING REAL-TIME DATA OVER PUBLIC WANs AND LANs

Rapid development of geographically-distributed real-time applications has traditionally been time-consuming and costly. Unlike systems deployed only on LANs, developers have had to accommodate the lower quality of wide area communication, the constraints and complexity of public infrastructure, and disruptions caused by roaming.

The ability to prioritize and secure dataflows is key for remote applications, in order to avoid performance and latency issues that can lead to disaster. How do you manage the prioritization and handling of dataflows in the most performant way? How do you get the most critical information first without overloading system resources? Most importantly, how do you scale it? Ideally, a solution is needed that can easily adapt to evolving needs across a variety of global use cases.

Connex Anywhere, based on the Data Distribution Service (DDS™) standard, is the first software framework to make communication over WAN and public LAN not only easier, but also more cost-effective. It can provide a firm foundation for offering Capability-as-a-Service on a global scale, even enabling companies to enter new markets.

RTI has extensive experience supporting customers in a variety of industries. As a result, Connex Anywhere is designed to work across such varied use cases as autonomous underwater vehicles, mining operations, or any situation in which a single operator needs to efficiently control multiple robots, trucks or other machines, regardless of proximity. Expanding remote functionality over WAN is particularly valuable when devices are mobile, or deployed in inaccessible or inhospitable locations where deploying on-site teams is either financially impractical or simply impossible.

Connex Anywhere make it simple to:

- Deploy over diverse network types
- Establish flexible security policies to provide authentication and govern access control
- Add capabilities to existing applications, as well as take advantage of new technologies

BENEFITS OF CONNEXT ANYWHERE:

Supports IP Mobility – Applications can roam between different networks, including cellular networks, changing addresses

Allows NAT Traversal – Applications can communicate easily from private to public, as well as from private to private addresses

Offers Data Security – WAN applications are secured scalably through the use of the RTI Security Plugins

Provides a Single-vendor WAN Framework – No dependency on any other third-party products, such as STUN servers, to enable the solution

UDP-based – Continues to scale seamlessly with the number of connections. Reliable or best-effort delivery and everything in between

IMPLEMENTING REAL-TIME WAN TRANSPORT AND TRANSPORT-INDEPENDENT APIs

It's no secret that the public internet was never conceived for uses such as controlling sensor networks, drones, trucks and submersibles. Its underlying nature doesn't support real-time application interactions at the right level of reliability, nor does it implement the safety and security measures necessary for mission-critical remote operation applications.

Connex Anywhere offers a secure and high-performant way to overcome that hurdle. RTI's UDP-based protocol offers a range of reliability options for data delivery over unreliable connections and even when switching networks. This helps create a solution that can be performant and scalable even over WAN. In essence, Connex Anywhere enables users to achieve low latency and high throughput over mobile and wide area networks without custom development through its Real-Time WAN Transport capability. Built-in lossless data compression algorithms further maximize the effective throughput.

Another key Connex Anywhere advantage is the ability to develop modular systems using RTI's network-agnostic DDS-compliant APIs that can easily be deployed over disparate transports — from shared memory to LANs to WANs — without source code changes. These APIs also allow developers to quickly support deployment-specific networking environments, as well as emerging technologies such as 5G.

As a result, Connex Anywhere users are free to use such widely differing network types as CANbus, DeviceNet, BACnet, EtherCAT, Modbus, Profinet and even private fiber networks. This can help accelerate the performance of WAN and LAN data flows, as well as time-to-market for new applications and products. Instead of having to rip-and-replace existing infrastructure, users can adopt the Connex Anywhere software framework to allow the development of modular remote operation applications.

IMPLEMENTING NAT TRAVERSAL WITH CLOUD DISCOVERY SERVICE

For applications that operate over mobile, wide area and public networks, the disruptions caused by roaming and the complex issue of Network Address Translation (NAT) can be overwhelming to design around. NAT traversal involves modifying network address information in the IP header of packets while they are in transit across a traffic routing device. As a result, working with the constraints and complexity of public wireless infrastructure can sometimes seem like trying to tune up a car while it's moving at 65 miles per hour.





Connex Anywhere solves this challenge with RTI Cloud Discovery Service, which enables dynamic discovery between applications on private networks. Applications can establish peer-to-peer communication across networks without multicast and with support for NAT traversal from private to public, as well as from private to private addresses, the latter with the help of Cloud Discovery Service running in the cloud (or anywhere publicly visible).

Cloud Discovery Service has two immediate value propositions for system operators. One is the ability to act as a directory service, allowing applications to discover each other in multicast-less environments without knowing their IP addresses. Second, in typical stacks over WAN, users are sometimes forced to integrate third-party components for NAT traversal and discovery, Connex Anywhere is a turn-key solution that enables users to abandon non-optimal TCP and run all DDS over UDP over WAN. This enables teams to design products faster while lowering costs, allowing them to focus on their core competencies — system development, data analysis and user experience.

CONNEX ANYWHERE USE CASES

Connex Anywhere spans multiple industries and supports applications that need to communicate over WAN. What all these industries have in common is a clear business case for working with geographically dispersed teams and remote networks. Whether it's across dangerous terrain, distant locations, third-party networks or foreign borders, Connex Anywhere prioritizes new levels of efficiency for WAN collaboration in defense, aeronautics, hospitals, mining, underwater exploration, and more. These scenarios include:

Mining Vehicles

The remote management of mining vehicles is often complicated by the need to interact with third-party networks belonging to mine operators and secondary vendors. Connex Anywhere addresses this challenge through its Real-Time WAN Transport feature in an edge-to-datacenter communication model.

Connex Anywhere not only provides the software framework to handle connectivity and security for these important applications and tasks, but also enables massive scalability that is otherwise costly and time-consuming to achieve.

Underwater Vehicles

Underwater vehicles present a dual challenge: First, operating or controlling the vehicle itself requires sophisticated functionality and a way to maintain reliable bandwidth. And second, these vehicles often need a reliable way to share data to the cloud as part of high-value research or recovery missions.

Connex Anywhere offers the RTI Cloud Discovery Service feature for users who want to run services on the cloud, which can include a public cloud such as Amazon Web Services (AWS) or Azure, or even a private cloud. These devices can include remote machinery, underwater drones or trucks from which data needs to be shared, analyzed or used to run advanced algorithms. Connex Anywhere can make both fixed and virtual remote applications for these use cases discoverable, as well as enable the sharing of data directly from a private cloud to a public cloud.

Robotics

Robotics covers a wide range of applications, which may include Robotics-as-a-Service, surgical robotics or even industrial automation and manufacturing tasks. In each scenario, the attributes needed are primarily speed and scalability, though security for dataflows is also a key priority. However, in a typical relayed edge-to-edge scenario, different edge devices may sometimes struggle to communicate effectively. The obstacle is that Endpoints in a LAN are running behind a NAT-enabled router. In addition, the Endpoints are mobile and can roam and move from one network to another.

Connex Anywhere offers NAT traversal and IP mobility capabilities with the RTI Real-Time WAN Transport and RTI Cloud Discovery Service features to optimize and secure operational dataflows and maintain split-second response times for business-critical robotics applications.

CONCLUSION

RTI Connex Anywhere was designed to help developers of widely distributed systems share real-time data over public WANs and LANs, while delivering the security and reliability needed to support remote operation capabilities. The benefits of this DDS-based software framework include:

- **Faster Time-to-Market** – Connex Anywhere offers a mature, field-tested and robust connectivity framework that can help accelerate time-to-market for new and innovative production grade applications.
- **Proven Foundation** – Connex Anywhere offers a trusted and proven connectivity foundation to help avoid the risk and opportunity costs of going down the wrong path.
- **Support for the Full Product Life Cycle** – Connex Anywhere can be utilized throughout the project life cycle — from proof-of-concept or prototype, through deployment at scale. Users can quickly prototype and develop distributed systems on complex network topologies using built-in configuration profiles and graphical development and debugging tools.

ABOUT RTI

Real-Time Innovations (RTI) is the largest software framework company for autonomous systems. RTI Connex® is the world's leading architecture for developing intelligent distributed systems. Uniquely, Connex shares data directly, connecting AI algorithms to real-time networks of devices to build autonomous systems.

RTI is the best in the world at ensuring our customers' success in deploying production systems. With over 1,800 designs, RTI software runs over 250 autonomous vehicle programs, controls the largest power plants in North America, coordinates combat management on U.S. Navy ships, drives a new generation of medical robotics, enables flying cars, and provides 24/7 intelligence for hospital and emergency medicine. RTI runs a smarter world.

RTI is the leading vendor of products compliant with the Object Management Group® (OMG®) Data Distribution Service (DDS™) standard. RTI is privately held and headquartered in Sunnyvale, California with regional offices in Colorado, Spain and Singapore.

Download a free 30-day trial of the latest, fully-functional Connex software today: www.rti.com/downloads.

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