

**Microamp**

# **Building Secure, Multi-Gigabit Networks for Mission-Critical Connectivity**

Encrypted 5G mmWave Networks for Defense,  
Emergency Response, Governments  
and Enterprises

SOLUTION BRIEF

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in partnership with:



**THALES**

# Executive Summary

In today's hyper-connected world, where data security and high-performance communication are essential, decision-makers face the dual challenge of maintaining both the performance and security of their communication infrastructure. This is especially critical in defense, emergency connectivity, and mission-critical operations, where processing massive data sets in real time is crucial, and data breaches can have severe consequences.

Microamp 5G mmWave network provides the multi-gigabit throughput and ultra-low latency demanded by the most challenging applications. To enhance security, network traffic can be encrypted using Thales Multilink Network Encryptors, which are integrated within the network. This creates a powerful solution that meets the rigorous requirements of defense and mission-critical operations.

This whitepaper explores the solution in detail, highlighting how the network delivers uncompromised performance while maintaining the highest security standards. It also examines potential use cases across defense, public safety and emergency response scenarios.



**Marcin Goralczyk, PhD**  
CTO & co-founder, Microamp

## Key Points:

- Microamp end-to-end 5G mmWave wireless network leverages Druid Software core network and Thales encryptors.
- A multi-gigabit, near-zero latency performance and superior signal stability.
- Fully secured data streams encrypted with AES-256 GCM algorithms.
- Encryption does not impact the performance and latency of the network.
- Designed for defense, emergency response, governmental and enterprise use.

# Solution Overview

Microamp 5G mmWave is an end-to-end private network that creates ultra-high capacity coverage and allows for time-sensitive wireless connectivity.

By leveraging advanced Microamp Cellbox Air 5G mmWave radio units and unique acceleration algorithms, the network delivers multi-gigabit throughput, near-zero latency, and carrier-grade signal stability.

Configured as a ruggedized, mission-critical network, Microamp 5G mmWave offers comprehensive set of features and a scalable core provided by Druid Software. It can be deployed within hours and easily adapted to defense or rapid response scenarios.

The solution integrates Thales CN6140 Multilink Network Encryptors, securing N2/N3 interfaces between the core network and the Microamp 5G mmWave gNodeB using AES-256 GCM algorithms, ensuring the high level of data security required by defense and government institutions.

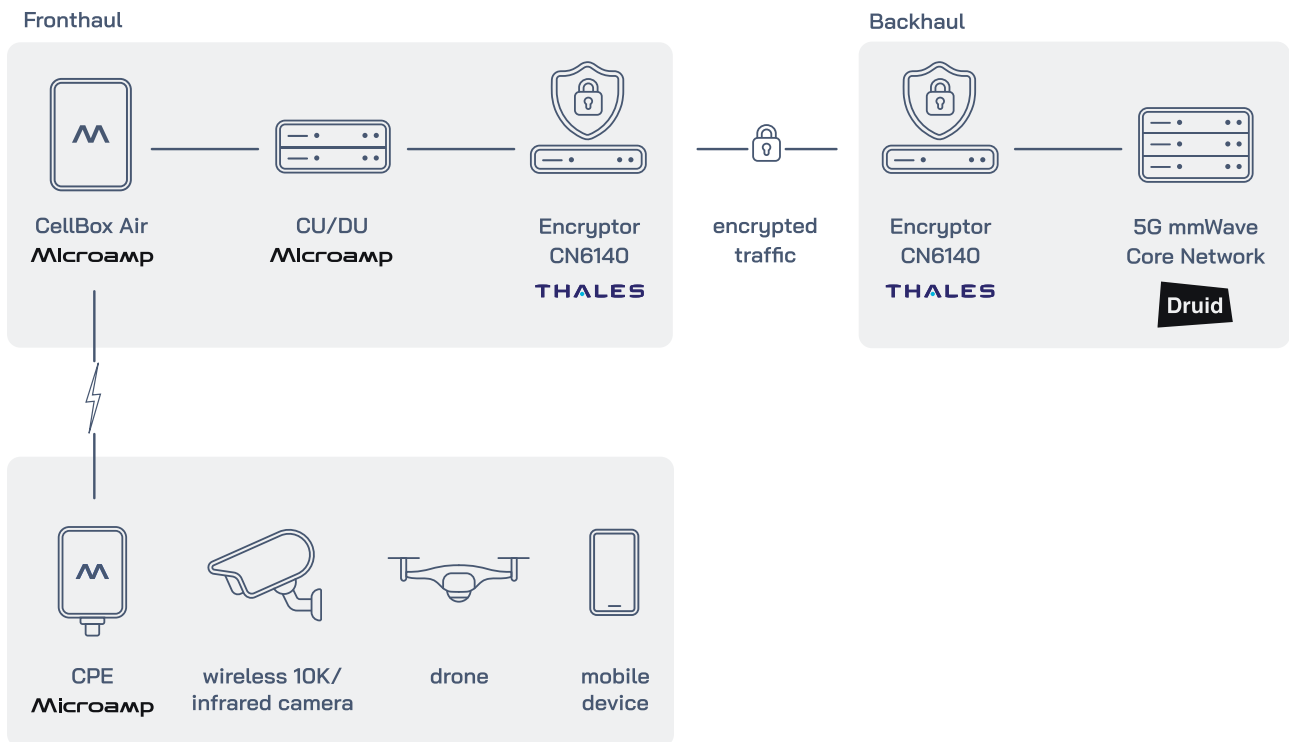


Figure 1: solution architecture

## Key Components

### Microamp 5G mmWave CellBox Air radio

A resilient and portable 5G mmWave radio designed for outdoor and macro cell deployments. The Microamp CellBox Air features a cutting-edge FR antenna design, unique acceleration algorithms and advanced beamforming technology, ensuring uninterrupted signal quality and extended range in various weather and environmental conditions.

## Microamp 5G mmWave RAN

A 3GPP-compliant, 5G mmWave-optimized RAN, powered by the unique algorithms accelerating performance in the L1 Phy layer providing high computing capacity.

## Druid Raemis™ Core Network

Druid Software provides the 3GPP-compliant mobile core platform Druid Raemis™, supporting 5G mmWave Standalone deployments. Designed for mission-critical communications, this scalable solution allows the rapid deployment of small or large tactical networks.

## Thales Encryptors

For enhanced security, the Thales CN6140 Multilink Network Encryptor is applied on both the gNodeB and Core Network sides. The CN6140 operates in full duplex mode at full speed, ensuring high-performance encryption with no packet loss.

# Applications

Microamp 5G mmWave network excels in high-stakes environments where secure, real-time data processing and uncompromised communication are mission-critical. From battlefield operations to supporting public institutions, the solution delivers the throughput and reliability required for the most demanding applications while maintaining military-grade security.

In defense and military scenarios, the network enables rapid command post deployment, real-time battlefield intelligence via body cameras and drone feeds, and comprehensive tactical data analysis.

Emergency response teams benefit from the network's portability, enabling immediate field deployment to support remote medical assistance, coordinated multi-agency operations, and other critical crisis response efforts.

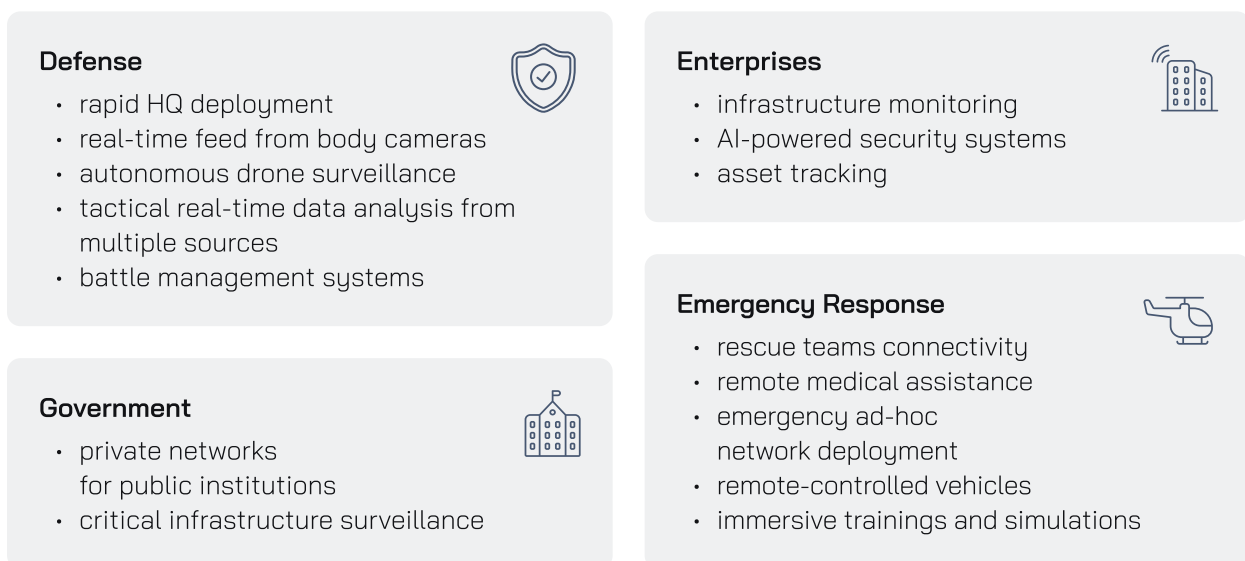


Figure 2: Microamp 5G mmWave: potential applications

Beyond mission-critical applications, Microamp 5G mmWave drives digital transformation across enterprises and public institutions. It supports advanced manufacturing operations, automated logistics systems, and critical infrastructure monitoring—all while upholding the highest security standards with military-grade encryption.

## Performance

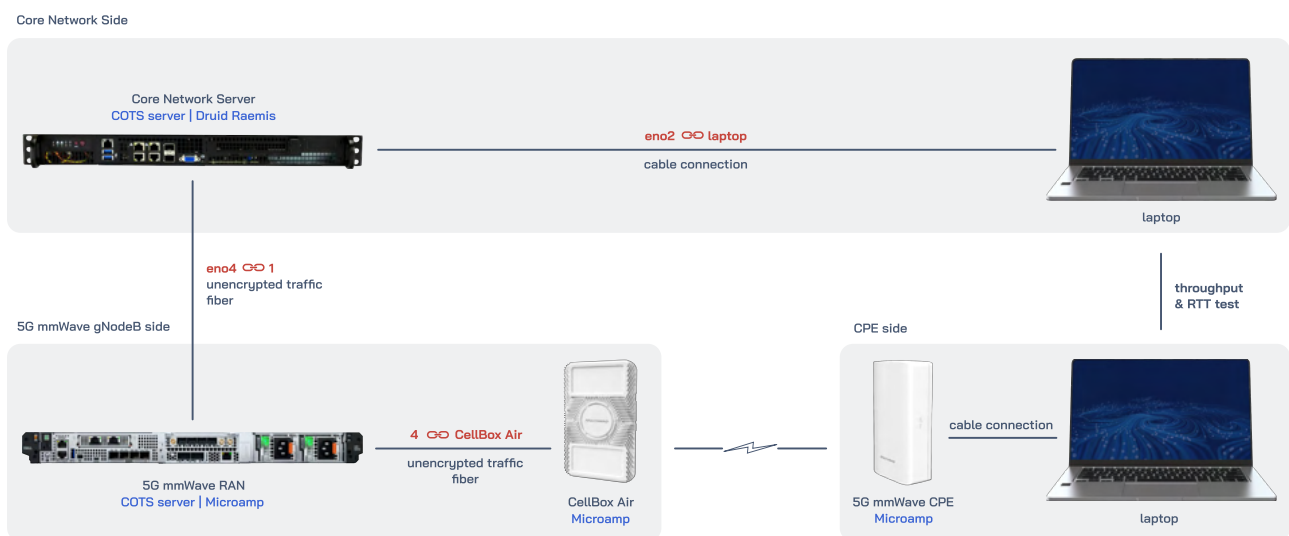
In most cases, encrypting the traffic within 5G networks results in the decreased throughput and increased latency. Microamp 5G mmWave eliminates this effect with an innovative architecture that sustains peak performance while implementing military-grade encryption. Our testing confirms that the encryption have a negligible impact on network performance, enabling organizations to deploy comprehensive security without compromising the multi-gigabit throughput and near-zero latency required for mission-critical operations.

To validate the minimal impact of encryption on performance, maximum uplink/downlink throughput and latency (Round Trip Time) were measured under two configurations: with and without encryption. For simplicity in performance testing, the Microamp CellBox Air gNB utilized a 400 MHz bandwidth (4CC x 100 MHz) with two downlink and uplink layers and a DDSU TDD pattern on the n257 band. Performance metrics were captured using the User Datagram Protocol (UDP) with a maximum MTU of 1392 in a 5G network environment.

### Baseline Configuration

In the baseline setup, the Microamp gNodeB was connected directly to the core network without traffic encryption (Figure 3). This configuration provided the baseline performance data.

Unencrypted traffic was transmitted via fiber using 10G SFP+ transceivers between the DU and RU on the gNodeB side, as well as between the RAN and core network servers. The N2 and N3 layers utilized a single interface.



**Figure 3:** Baseline Microamp 5G mmWave network configuration

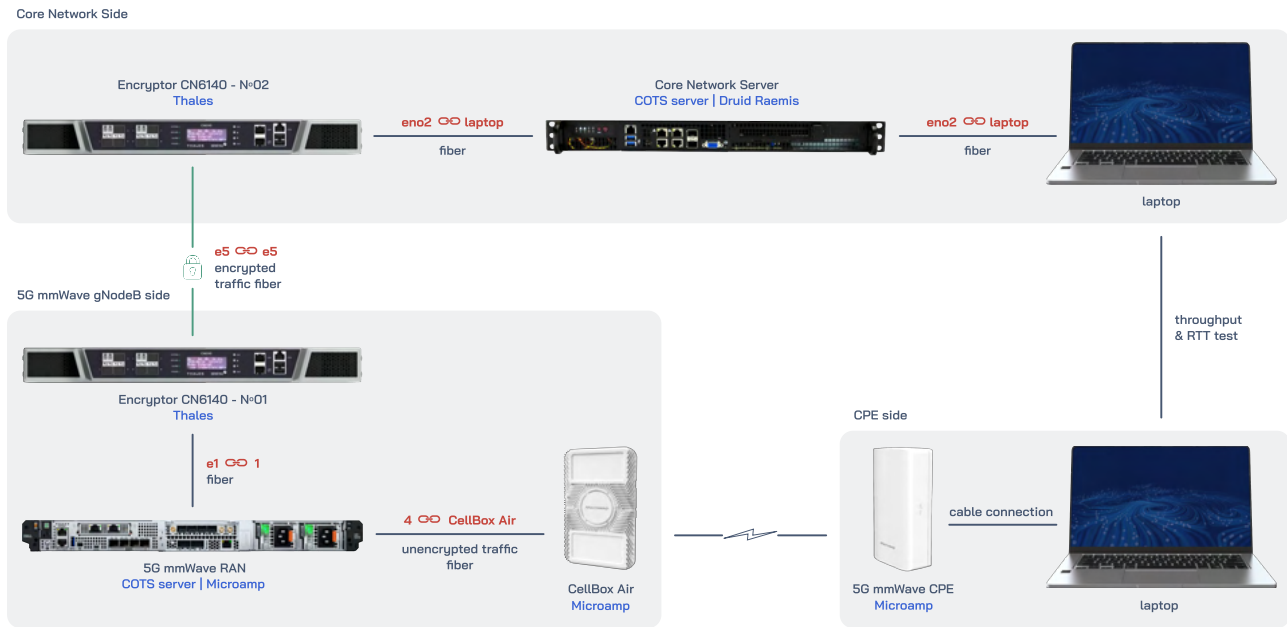
**5G mmWave gNodeB side:** Microamp CellBox Air Radio, Microamp RAN Software on the COTS server;

**Core Network side:** COTS server with Druid Raemis software; **CPE side:** U501 5G mmWave CPE

## Encryption-Enabled Configuration

In the encryption-enabled setup, two Thales CN6140 Encryptors were deployed to secure the N2/N3 interfaces on the gNodeB and core network sides (Figure 4).

Traffic was transmitted via fiber using 10G SFP+ transceivers, with data between the gNodeB and the core network encrypted using AES-256 GCM algorithms.



**Figure 4:** Encryption-enabled Microamp 5G mmWave network configuration

**5G mmWave gNodeB side:** Microamp CellBox Air radio, Microamp RAN Software on the COTS server, Thales Encryptor cn6140;

**Core Network side:** Thales Encryptor cn6140, COTS server with Druid Raemis software; **CPE side:** U501 5G mmWave CPE



**Photo 1:** Microamp 5G mmWave CellBox Air radio



**Photo 2:** Encryption-enabled network configuration

Data flows within the network can be encrypted and secured without compromising network performance.

Encryption causes a negligible performance impact: imperceptible reduction in throughput (<1%, figure 4 - 5) and a negligible RTT increase (+0.2 ms, figure 6), confirming its suitability for mission-critical applications that require secure, large-scale data transmission in real-time.

Thales Encryptors are fully compatible with the Microamp 5G mmWave network, and encrypted traffic maintains confidentiality and integrity under the AES-256 GCM algorithm.

## Downlink Performance

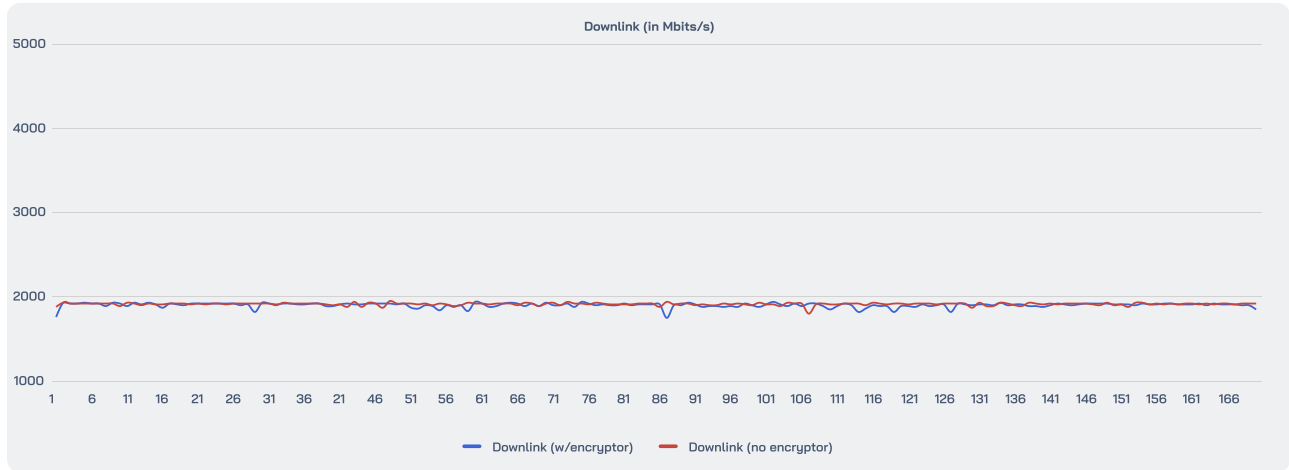


Figure 4: Downlink Measurement

**Baseline Configuration:** Median: 1921 Mbps, SD: 15.54

**Encryption Enabled Configuration:** Median: 1911 Mbps, SD: 27.49

## Uplink Performance

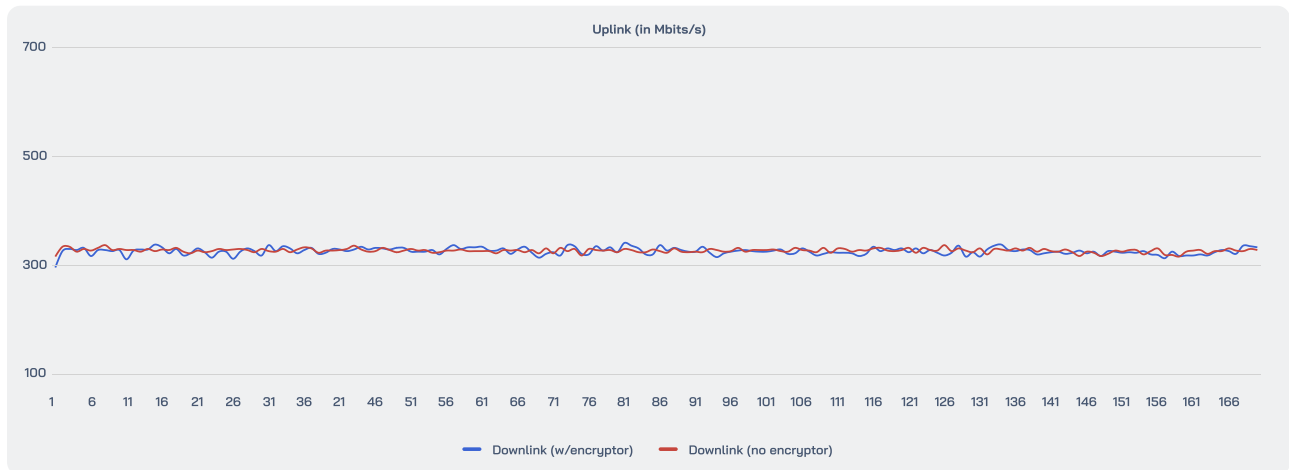


Figure 5: Uplink Measurement

**Baseline Configuration:** Median: 328 Mbps, SD: 3.68

**Encryption Enabled Configuration:** Median: 327 Mbps, SD: 6.31

## Round Trip Time

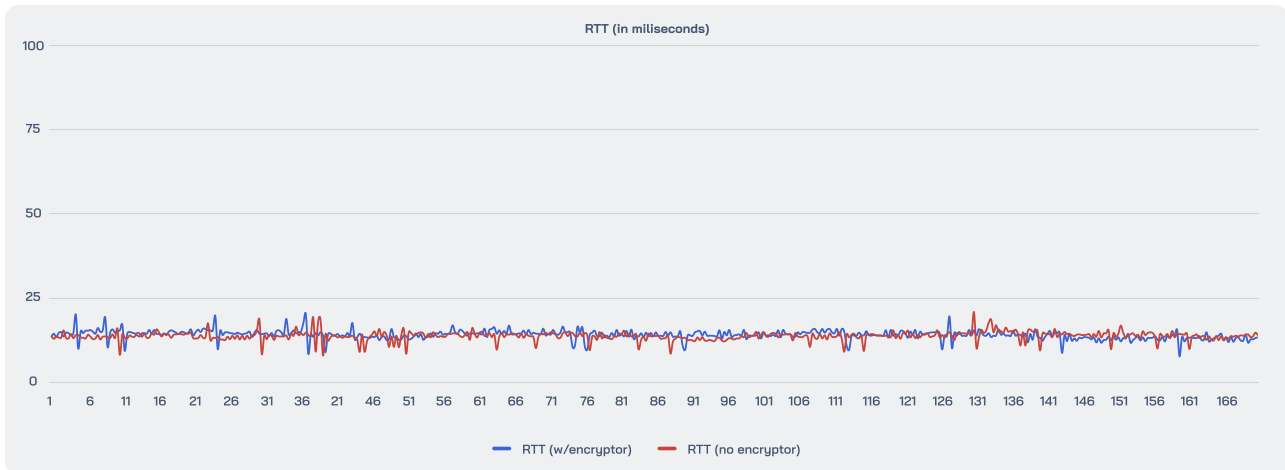


Figure 6: RTT measurement

Baseline Configuration: Median: 13,8 ms, SD: 1.36

Encryption Enabled Configuration: Median: 14,1 ms, SD: 1.41

## Summary

Microamp 5G mmWave networks provide secure, high-performance wireless connectivity tailored for mission-critical operations. Comprehensive testing has confirmed that our solution maintains superior performance and near-zero latency, even with military-grade encryption.

The network's versatility and rapid deployment capabilities make it ideal for a wide range of operational scenarios, including tactical military communications, emergency response and industrial use cases. Its modular architecture supports seamless scaling, while the ruggedized, portable design ensures quick setup in challenging environments. With flexible features and a scalable core, the network can be easily adapted to specific mission requirements without compromising performance or security.

As organizations face increasing demands for secure, high-speed data transmission, Microamp offers a future-proof platform for mission-critical connectivity. By integrating military-grade security with exceptional performance in an agile, deployable package, we are driving a new era of secure wireless networking that meets the most stringent operational requirements and adapts to ever-evolving needs.

### Solution Advantages

- Private network of military-grade data security
- Ability to run time-sensitive, mission-critical applications in locations typically lacking consistent network connectivity
- On-demand coverage and flexibility
- Multi-gigabit throughput and near-zero latency
- Portable, scalable, and easy-to-deploy
- Standalone, 3GPP-compliant solution



# Solution Specification

## Microamp CellBox 5G mmWave gNodeB

Microamp

**Throughput:** 4+ Gbps

**Latency:** < 5 ms

**Bandwidth:** 800 MHz OBW 1600 MHz IBW

**Frequency band:** 5G mmWave n257, n258

**Application:** outdoor, macro cell

**Duplex:** TDD

## Thales CN6140 Multilink Network Encryptor

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**Maximum speed:** up to 40 Gbps (4x10 Gbps)

**Latency:** < 10µS

**Cryptographic algorithm/key length:** AES-128 or AES-256

**AES modes supported:** CFB, CTR, GCM

**Alternate configurations:** 1x1 Gbps up to 4x10 Gbps

**Certifications:** Common Criteria EAL4+, FIPS 140-3 Level 3

## Druid Raemis™ Core

Druid

3GPP-compliant 4G/5G core

open RESTful API

Enterprise Slicing

## Microamp U501 5G mmWave CPE

Microamp

**Frequency band:** 5G mmWave/5G

**Ethernet:** 5G Base-T Ethernet, POE

**MIMO:** 2x2

**BB Chipset:** Qualcomm X65

**Certifications/Standards:** CE/FCC/RoHS

**Waterproof level:** IP65

# Company Profiles

## Microamp

Microamp is a leading tech innovator designing and delivering multi-gigabit and ultra-low latency 5G mmWave wireless networks based on purpose-built radios. The company merges deep tech know-how and a broad portfolio of technology partners, empowering industries, system integrators, MNOs, DSPs, governments, and research institutions with new dimensions of wireless connectivity.

Microamp's cutting-edge networks enable the implementation of the most technologically advanced applications that require processing huge amounts of data in real time such as autonomous vehicles connectivity, AI reasoning, 10K and infrared camera sensors and security systems, remote controlling or ultra-quality live video and audio streaming.

## THALES

Thales (Euronext Paris: HO) is a global leader in advanced technologies specializing in three business domains: defense & security, aeronautics & space, and cybersecurity & digital identity.

It develops products and solutions that help make the world safer, greener, and more inclusive.

The Group invests close to €4 billion a year in Research & Development, particularly in key innovation areas such as AI, cybersecurity, quantum technologies, cloud technologies, and 6G.

Thales has close to 81,000 employees in 68 countries. In 2023, the Group generated sales of €18.4 billion.

## Druid

Druid Software, founded in 2000 and headquartered in Ireland, is an industry leader in private cellular network technology and provides enterprise-grade core network platforms to advance connectivity and enable simplified private network management. Druid's customers & partners globally use Raemis™ to connect applications, devices, and radios, benefiting from enhanced security, performance, and cost-efficiency.

Raemis™ platform is a mature 3GPP compliant 5G & 4G core network designed for business and mission-critical use across all industries. Druid's technology enables solutions in different areas, including Enterprise Communications, IoT, Mobile Edge Computing, Neutral Host, Public Safety, and more.

**For sales inquiries please contact [hello@microamp-solutions.com](mailto:hello@microamp-solutions.com)  
or visit [microamp-solutions.com](https://microamp-solutions.com)**