

ERICA 220 MHz Band

Technology Prospectus

VIE Technologies' innovative piece of Intellectual Property (IP), Enhanced Range Intelligent Communications Architecture (ERICA), is designed for industrial, critical infrastructure, and agricultural Internet of Things (IoT) applications that can significantly benefit from a long range, low cost, and scalable low data rate solution. ERICA is tailored to leverage 5-kHz wide channels within the 220-222 MHz band, which is the optimal choice to implement these very long communication ranges due to the band's superior propagation and penetration characteristics. Overall, this is a simple, stable and capacity-efficient approach to the Low Power Wide Area Network (LP-WAN) IoT network model.

Key benefits of ERICA

- ✓ **Low Installment Costs:** The 5-kHz wide channel base can support up to 15,000 devices.
- ✓ **Excellent Propagation:** The low-band propagation characteristics of the 220 MHz band provides a significant advantage over all other bands used for IoT today.
- ✓ **Low Penetration Loss:** ERICA's extraordinary wall, foliage and other obstacle penetration possibilities using 220 MHz are a key difference for narrowband technology.
- ✓ **Long Range:** ERICA can achieve equal or better range than any of its competitors with significantly lower tower heights.
- ✓ **IoT Driven:** ERICA is envisioned to readily create a network that can support a sensor ecosystem addressing the particular needs of the Company's target markets.
- ✓ **Competitive Capacity at Low Latency:** With variable rate transmission, ERICA has the potential to become over ten times more efficient than the nearest competitor.
- ✓ **Rapid Deployment:** With clean spectrum available, the ERICA system is being designed for efficient and speedy deployment.

ERICA Differentiation

With the number of IoT devices increasing rapidly, there is a growing demand for end to end platforms, especially in the industrial, critical infrastructure, and agricultural sectors. ERICA systems can cover large areas with a single site, providing greater flexibility in tower selection which facilitates ease of access, availability of power, and choice of backhaul modalities. A pole-mounted ERICA base station antenna provides significantly higher coverage than other LP-WAN solutions due to superior propagation properties at 220 MHz as well as lack of interference unique to clean, licensed spectrum. This relaxes requirements on base station antenna height, thus achieving far lower deployment and maintenance costs. Under these additional constraints, it can similarly be demonstrated that 220 MHz performance would be far superior to the higher 900 MHz ISM bands in prevalent use.

Components of ERICA

ERICA is an application-centric design which reduces protocol overhead and provides cost-effective bandwidth-efficient communications with more efficient throughput and range than any competitors. Given that battery operated devices in such IoT installations are expected to last more than 10 years, and typical transmission from these devices is less than 300 bytes per day, many different applications can easily be supported - even at the lowest proposed data rate. ERICA will take varying data rates into account based on power availability and distance from the base station. Thus, the low data rate supported by the design will significantly increase the coverage area without impacting required performance. A dual system design of higher rate communications with high spectral efficiency for the majority of devices and lower rate communications for increasing the coverage area is the optimal plan for implementation.

ERICA envisions a forward-looking architecture that has not been implemented by any other competitor. This can be an advantage since it has little network planning at the moment, so the MAC solution will be designed to avoid interference caused by overlapping coverage, and the number of supported devices is sufficiently large to make a strong case for highly profitable deployments. The Remote Terminal Unit (RTU), the Base Station (BS), and the Intelligent Management Unit (IMU) are the three principal hardware components of the ERICA system. The system reliability, robustness, and security all depend on the MAC. The ERICA's MAC intends to implement a security solution that will allow the BS to operate as collector and forward the packets to and from the backend while still providing the same security guarantees.

The factors for IoT applications regarding battery power such as range per watt efficiency heavily favor narrowband techniques as well as low narrowband power consumption. In IoT use in large oil fields, broadband systems would cost significantly more and have less reliable connectivity. Broadband solutions are more power hungry and not suitable for remote IoT devices requiring battery or solar power, since most devices don't have access to power lines. Therefore, long range narrowband is the best solution for the majority of conditions, for low power wide area networks.

Conclusion

Overall, the technology offers a bidirectional communications capability to enable unrivalled Quality-of-Service (QoS), end-to-end security, add-on functionality, and edge computing. The system architecture will provide a highly resilient low-latency and high-capacity balanced communications protocol to serve the long-term needs of stringent industrial applications. The extremely low power design will support RTUs for many years on a single battery charge. The market momentum is in favor of earliest feasible ERICA deployment, and ERICA provides the range, coverage, and endpoints not available to any player in the U.S.

Systems like MyVIE can function autonomously and consistently optimize costs and machine life of IoT devices. This is important because predicting machine failures without a system requires high specialist costs for maintenance needed at all times. They provide secure data visible for evaluation on their mobile app, which also displays predictive results based on data it takes. It detects, connects, predicts, and protects all information incurred by the devices.