

### Artificial Intelligence Aided D-band Network for 5G Long Term Evolution

ARIADNE is a H2020 5G PPP project which aims to bring together a novel high frequency radio architecture, an advanced wireless connectivity based on reconfigurable metasurfaces, and an enhanced network management supported by AI to establish a new type of intelligent communications system beyond 5G.



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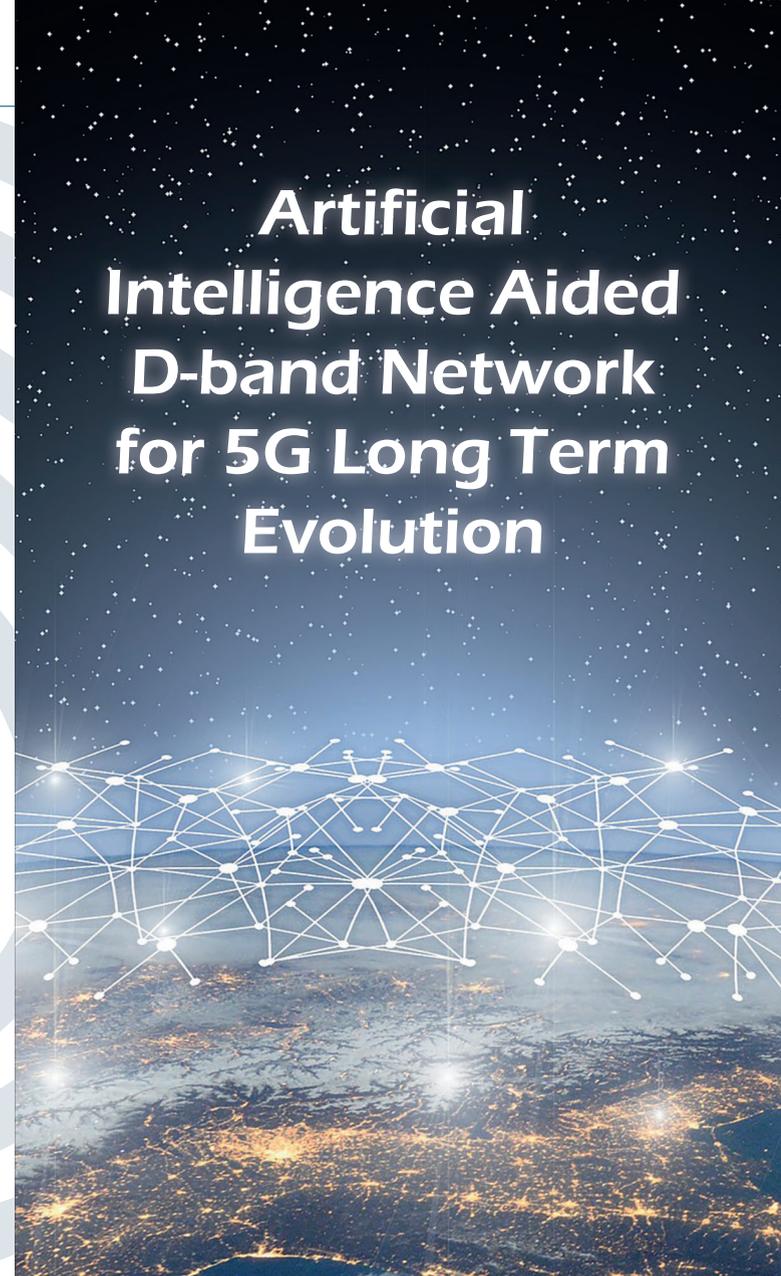
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Pillars	Objectives	Actions	Demos	Main KPIs
D-band for 100 Gbit/s reliable wireless connectivity	100 Gbit/s capable, energy and spectral-efficient D-Band wireless B5G networks	<ul style="list-style-type: none"> <li>D-band front-end</li> <li>Baseband DSP</li> <li>Adaptive spatial SP</li> <li>High gain D-band antennas</li> <li>Channel modelling</li> </ul>	P2P D-band LOS outdoor demo	100 Gbps throughput 100m range Massive number of devices Zero latency Ultra-high reliability
Communications beyond the Shannon paradigm	Ultra-reliable D-band connectivity and reconfigurability in all usage environments	<ul style="list-style-type: none"> <li>Reconfigurable adaptive metasurface design</li> <li>Beamforming for LOS and NLOS links</li> <li>MAC design</li> </ul>	Metasurface-based D-band demo	
Artificial Intelligence-based wireless system concept	Transform networks B5G into intelligent connectivity/computing platforms	<ul style="list-style-type: none"> <li>ML for channel modelling</li> <li>ML-based resource allocation and energy efficiency ML for network deployment optimization</li> </ul>	Intelligent D-band Network Demo	

ARIADNE Pillars and Objectives

The ARIADNE Pillars

1. Development of new radio technologies for communications using the above 100GHz D-band frequency range.
2. Investigation of emerging advanced connectivity approaches based on reconfigurable metasurfaces and propagation environments in D-band.
3. Application of Artificial Intelligence to high-frequency communications resource management with dynamic assignment and reconfiguration of metasurfaces, providing continuous and reliable high-bandwidth connections in Beyond-5G scenarios.

ARIADNE - Objectives and Vision

- Aspires bringing 5G wireless thinking to a long term vision of pervasive mobile virtual services, with computing and connectivity functions managed in an integrated way
- Envisions a unified system beyond 5G, bringing together a novel high frequency advanced radio architecture with an Artificial Intelligence network processing and management approach
- Aims to implement and showcase its beyond 5G wireless communications networks concept, addressing machine learning based, dynamic, ultra-high spectral efficient and reliable communications in the D-band, as well as intelligent network management in both "Line of Sight" (LOS) and "Non-Line of Sight" (NLOS) environments

ARIADNE system concept for networks beyond 5G

