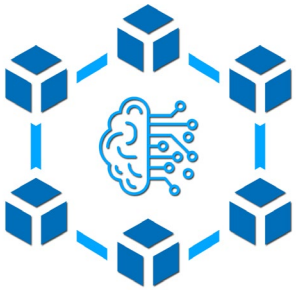

An Artificial Intelligent Aided Unified Network for Secure Beyond 5G Long Term Evolution

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NANCY project has received funding from the Smart Networks and Services Joint Undertaking (SNS JU) under the European Union's Horizon Europe research and innovation programme under Grant Agreement No 101096456.

Project Information

Project Coordinator: University Of Western Macedonia

EU Contribution: 6 Million

Start Date: 1st of January 2023

Duration: 36 Months

Consortium

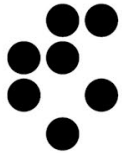
8 Research Institutes

5 Industry Organizations

9 SMEs

22 Partners

8 Countries


The aim of NANCY is to introduce **a secure and intelligent architecture** for B5G networks. Leveraging **AI and blockchain**, NANCY enables secure and **intelligent resource management, flexible networking, and orchestration**. In this direction, novel architectures, namely point-to-point (P2P) connectivity for device-to-device connectivity, mesh networking, and relay-based communications, as well as protocols for medium access, mobility management, and resource allocation are designed. These architectures and protocols will make the most by jointly optimizing the midhaul, and fronthaul. This is expected to enable truly **distributed intelligence** and transform the network to a low-power computing unit. Finally, in order to accommodate the particularities of the new RAN that are generated due to the use of novel building blocks, such as blockchain, multi-access edge computing, and AI, **a new experimentally-verified network information theoretic framework** will be presented.

NANCY Concept

Key performance Indicators

>20% impro-vement

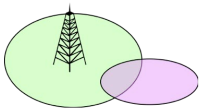
High security & privacy

Low latency (<1 ms)

Ultra-high reliability

Flexible scalability

Ultra-high availability

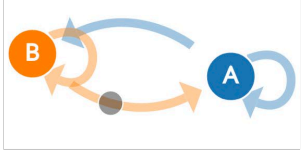


100m e2e range

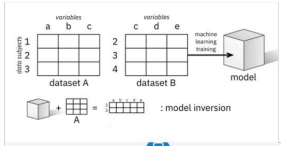
AI reusability rate > 90%

> 20% ownership cost reduction

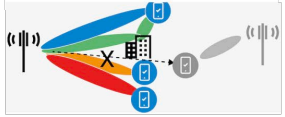
Fundamental characteristics



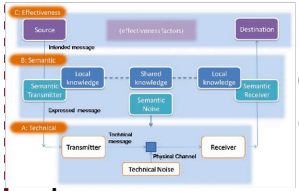
Blockchain modeling



Attacks modeling



Cell/grant free access



Semantic Communi-cations

Smart pricing

Technology enablers

Multi-access edge computing

Blockchain

Post-quantum cryptography

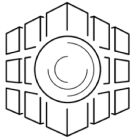
Caching/offloading policies

Key technology module

Artificial intelligence

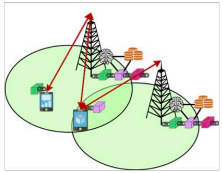
Orchestration

NG-SDN/NFV

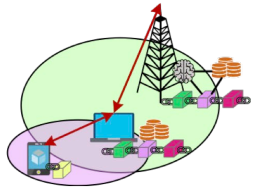


AI virtualisation

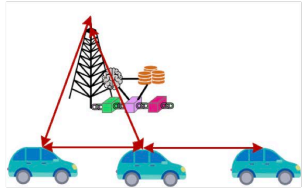
Usage scenarios



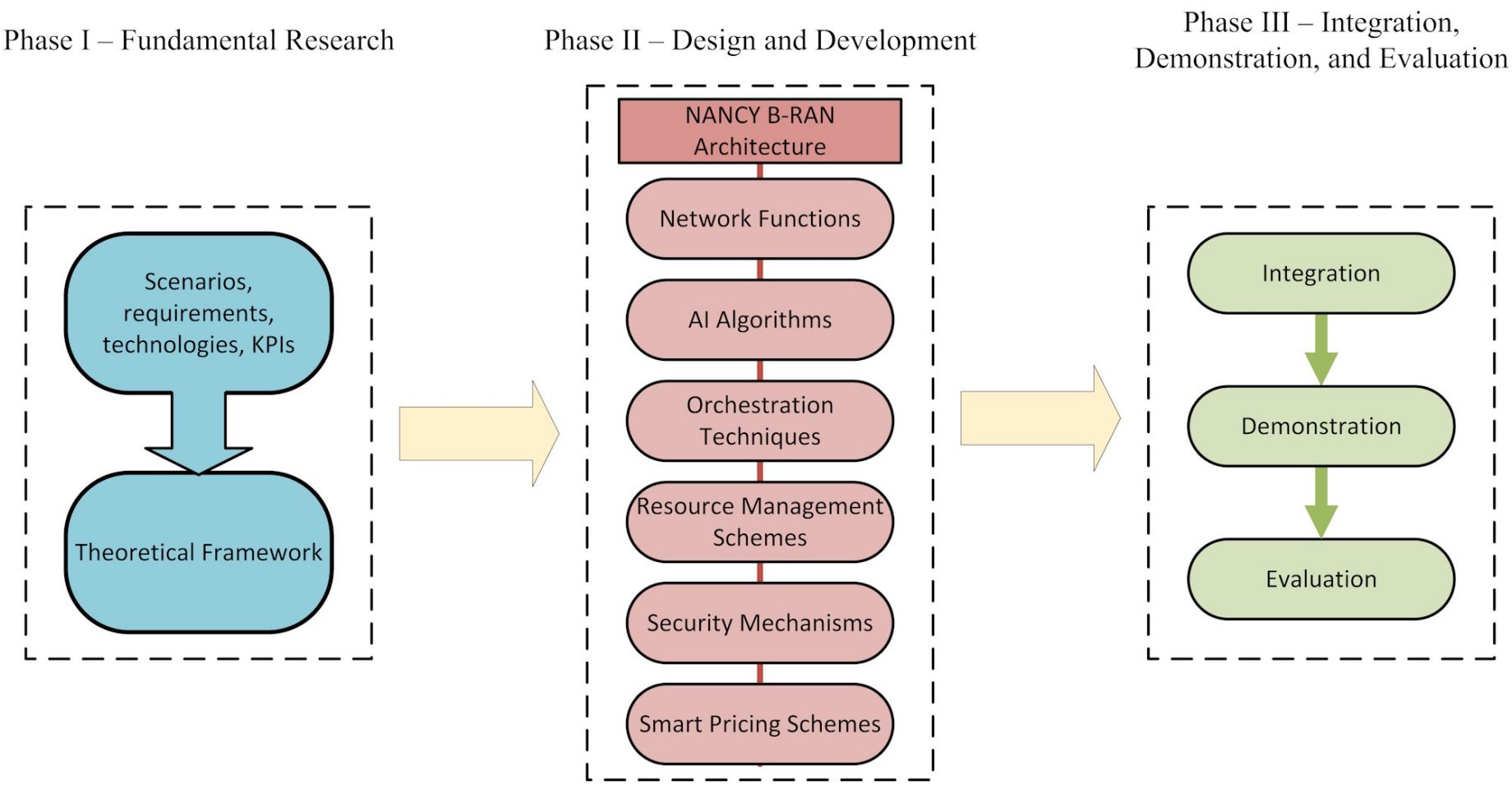
Fronthaul network of fixed topology

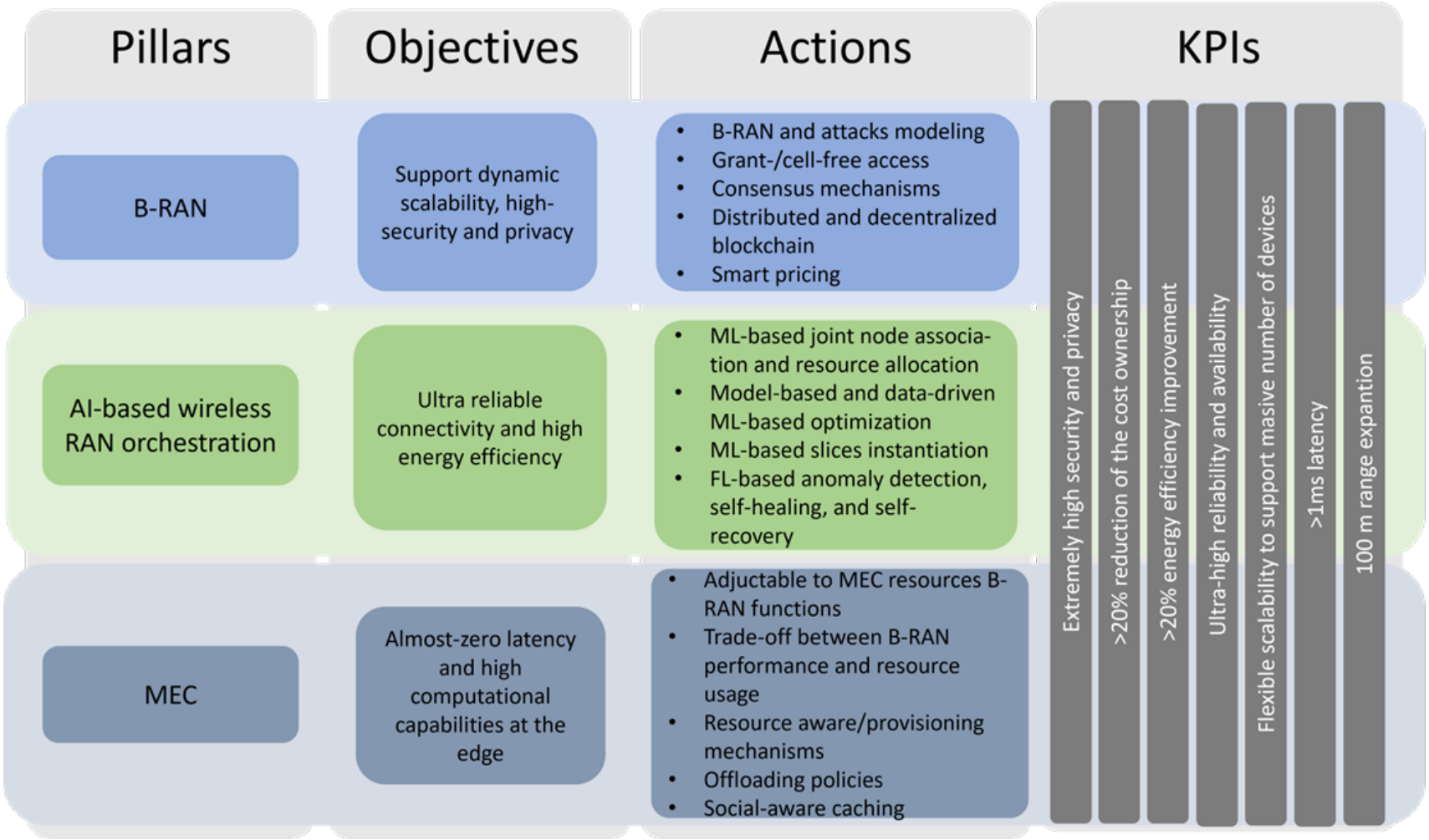


Advanced coverage expansion



Advanced connectivity of mobile nodes


Phase I – Fundamental Research
Phase II – Design and Development
Phase III – Integration, Demonstration, and Evaluation
Scenarios, requirements, technologies, KPIs
Theoretical Framework
NANCY B-RAN Architecture
Network Functions
AI Algorithms
Orchestration Techniques
Resource Management Schemes
Security Mechanisms
Smart Pricing Schemes
Integration
Demonstration
Evaluation


Pillars
Objectives
Actions
KPIs
B-RAN
Support dynamic scalability, high-security and privacy
B-RAN and attacks modeling
Grant-/cell-free access
Consensus mechanisms
Distributed and decentralized blockchain
Smart pricing
AI-based wireless RAN orchestration
Ultra reliable connectivity and high energy efficiency
ML-based joint node association and resource allocation
Model-based and data-driven ML-based optimization
ML-based slices instantiation
FL-based anomaly detection, self-healing, and self-recovery
MEC
Almost-zero latency and high computational capabilities at the edge
Adjuctable to MEC resources B-RAN functions
Trade-off between B-RAN performance and resource usage
Resource aware/provisioning mechanisms
Offloading policies
Social-aware caching
Extremely high security and privacy
>20% reduction of the cost ownership
>20% energy efficiency improvement
Ultra-high reliability and availability
Flexible scalability to support masive number of devices
>1ms latency
100 m range expantion

Demonstration and Validation

3 Large-scale Pilots

Massive IoT (Italy)

High-mobility Vehicles (Spain)

Advanced Multimedia Services (Greece)

2 Laboratory Testbeds

University of Western Macedonia (Greece)

Italtel (Italy)

Thank you for your attention!

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