



SMaRT-5G

(Sustainable Mobile and RAN Transformation)

August 2023

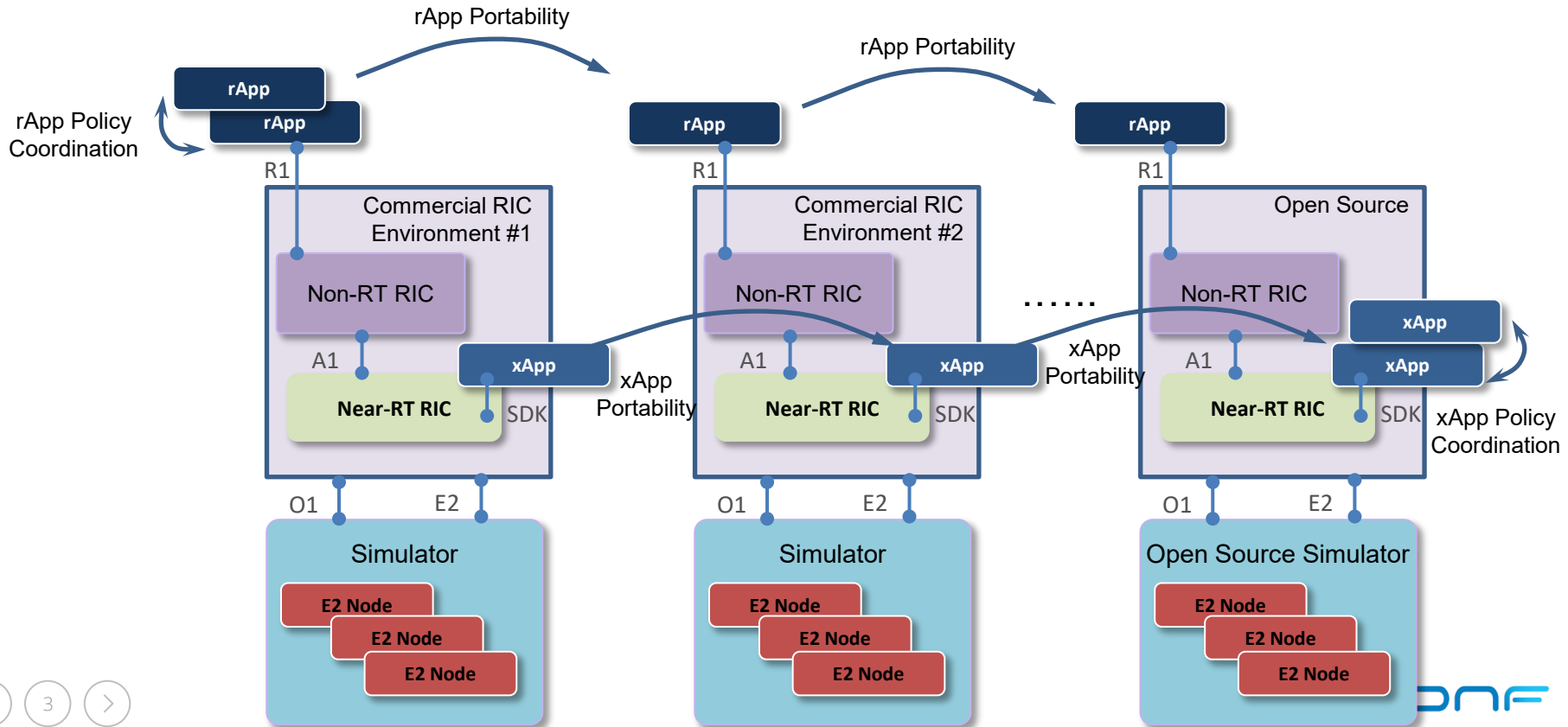
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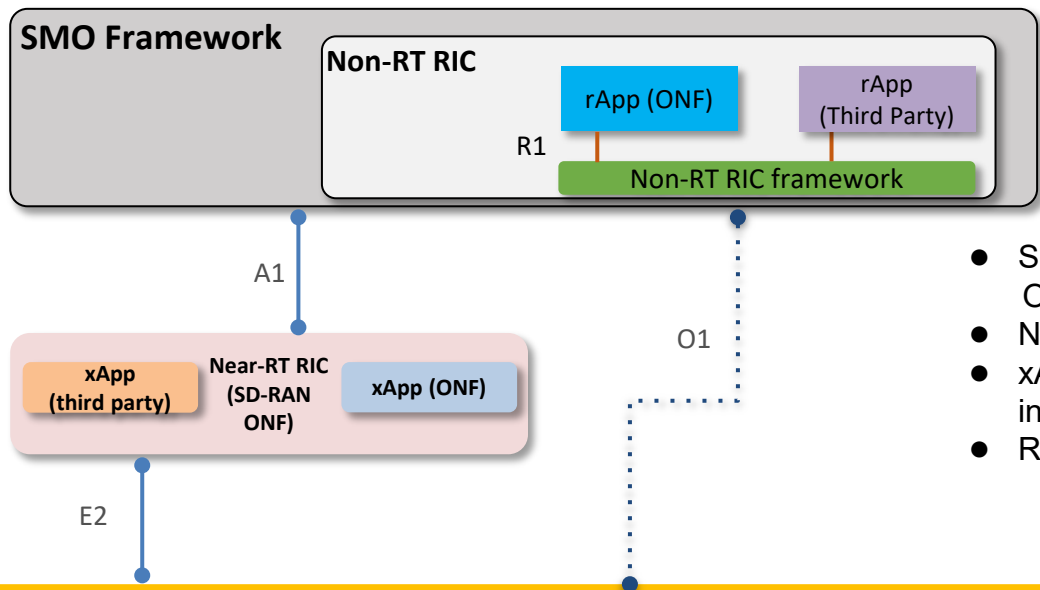
ONF's New Open RAN Initiative

- RRAIL (RAN RIC & App Integration Lab): Building a collaborative open environment to test and evaluate x/rApp portability to different RIC/RAN platforms and their interworking
 - Vendor stacks (Interoperability, portability and vendor collaboration)
 - Open source stack (for research and experimentation)
- SMaRT-5G: Series of PoCs (both commercial and open source options)
 - The SMaRT-5G use case leverages RRAIL
 - Both commercial vendors and/or ONF may implement rApps

RRAIL: Key Enabler of SMaRT-5G



RRAIL: Opensource Stack – High Level View



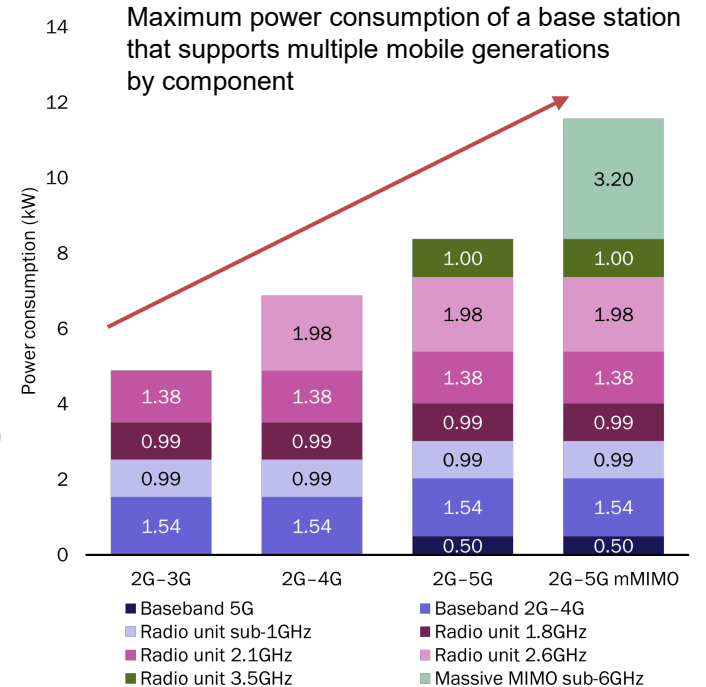
- SMO (based on ONAP) and Non-RT RIC from the O-RAN-SC community
- Near-RT RIC from ONF SD-RAN
- xApp and rApp from ONF with academic and industry collaboration (e.g., Intel, Rimedon)
- RAN Simulator:
 - Start with ONF RANSIM, Implement new/enhanced functionalities, progressively

- **RAN Models:** ONF RANSIM Model + Other available open source capabilities (NS3, Other ..)
- **RAN Data Processing:** Package data for E2 and O1
- **Interface Terminations:** E2 and O1
- **Capabilities to implement closed loop actions**

RAN SIMULATOR

Mobile Network Power Utilization is in a Sustainability Crisis

- Power utilization is a huge problem in mobile networks
 - Operators experiencing escalating power costs
 - Global pressure to reduce environmental impacts
- RAN energy costs represent 73% of network energy consumption for operators¹
 - Power costs are on the rise and shortages caused by geopolitical issues are further straining mobile networks (especially in Europe)
 - 5G power consumption **will likely triple**² from 2020 to 2030
 - A sustainability strategy is essential for the future viability of mobile networks



Source: Analysys Mason

¹ GMSA Intelligence, Going green: energy efficiency in telecoms

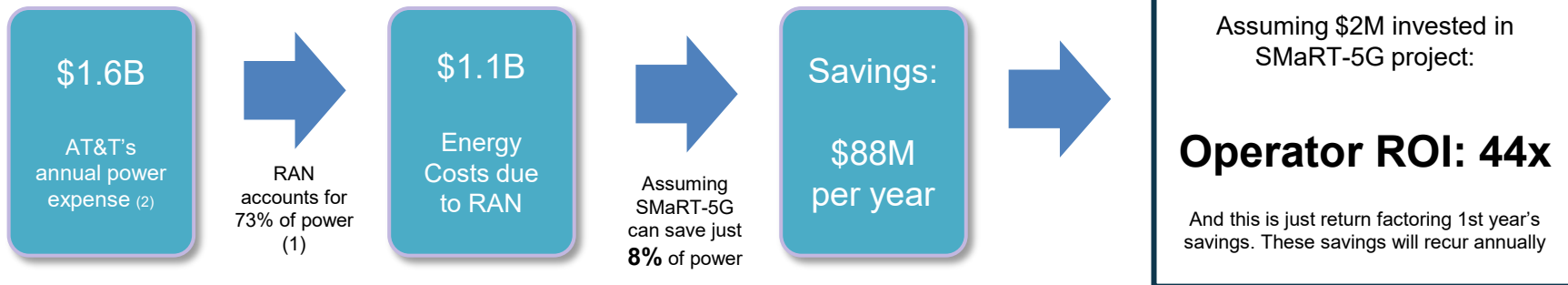
² GSMA Intelligence, By using network intelligence to cut RAN power consumption, ZTE is helping operators work toward sustainability goals

SMaRT-5G Benefits Operators and Vendors

- Operators at risk of deepening lock-in with current suite of proposed vendor solutions
 - Vendors are actively pitching solutions tied to their RAN (siloes, closed, vertically integrated)
 - Operators unable to select and successfully integrate best of breed solutions
- Vendors are not getting the full advantage of an ecosystem
 - Synergistic, complementing, interoperable and easily portable solutions among vendors are better
 - More opportunities to open up for smaller/new vendors
- ONF's model is uniquely suited to help both vendors and operators:
 - Create an operator/vendor ecosystem to help push the industry in a mutually supportive manner
 - Build PoCs provides a template demonstrating portability, interoperability and technology advancement
 - Dedicate a small engineering team to create open source solutions in collaboration with academia and interested vendors to further research and experimentation
 - Leverage field proven open source platforms such as SD-RAN, SD-Core, ONAP

ROI & Impact

Operator case study (AT&T): return on SMaRT 5G project investment



Global annual impact



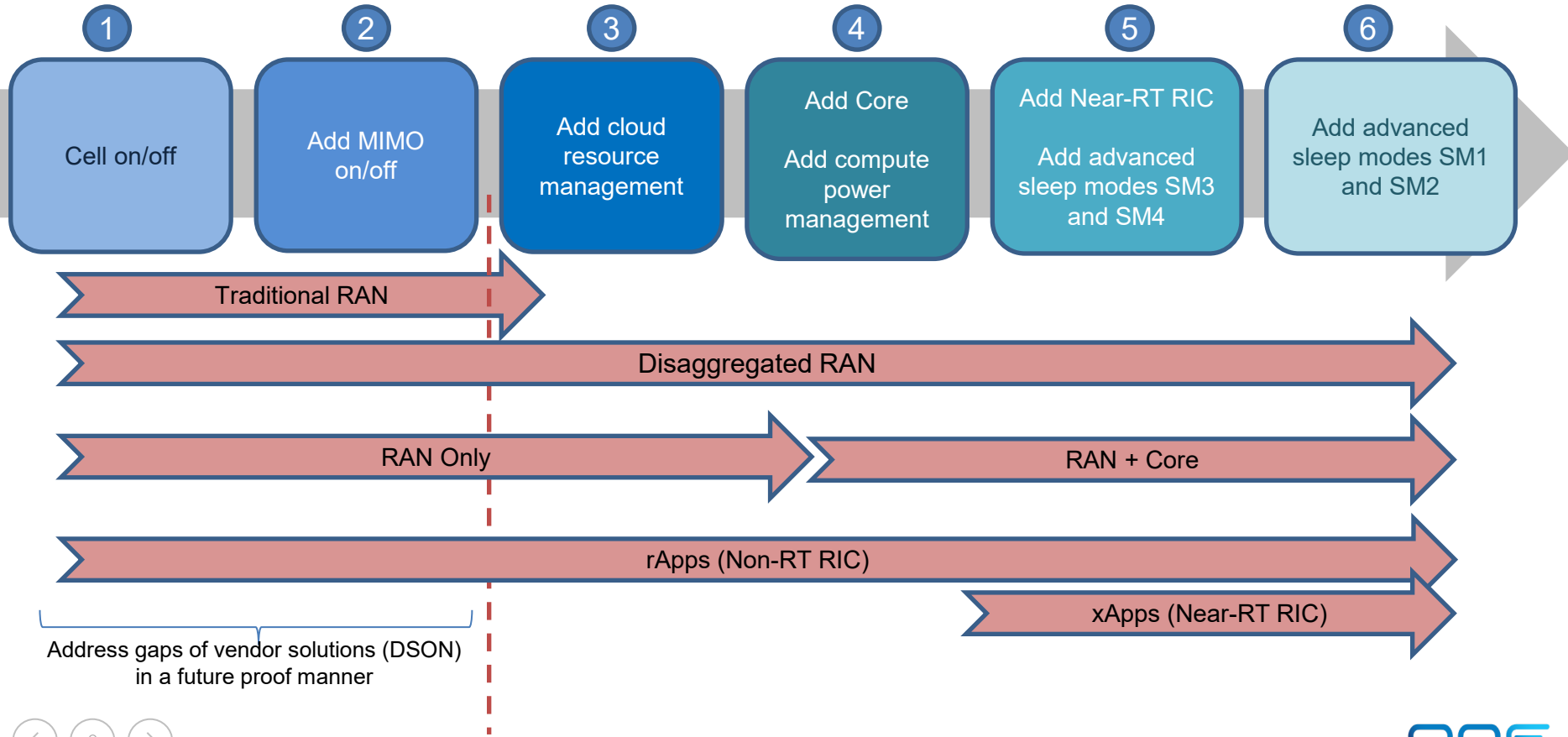
(1) <https://www.gsmainelligence.com/event/going-green-can-5g-be-energy-efficient/>

(2) [https://www.lightreading.com/climate-change/how-atandts-network-chief-hopes-to-cut-\\$16b-electricity-bill/d/d-id/780237](https://www.lightreading.com/climate-change/how-atandts-network-chief-hopes-to-cut-$16b-electricity-bill/d/d-id/780237)

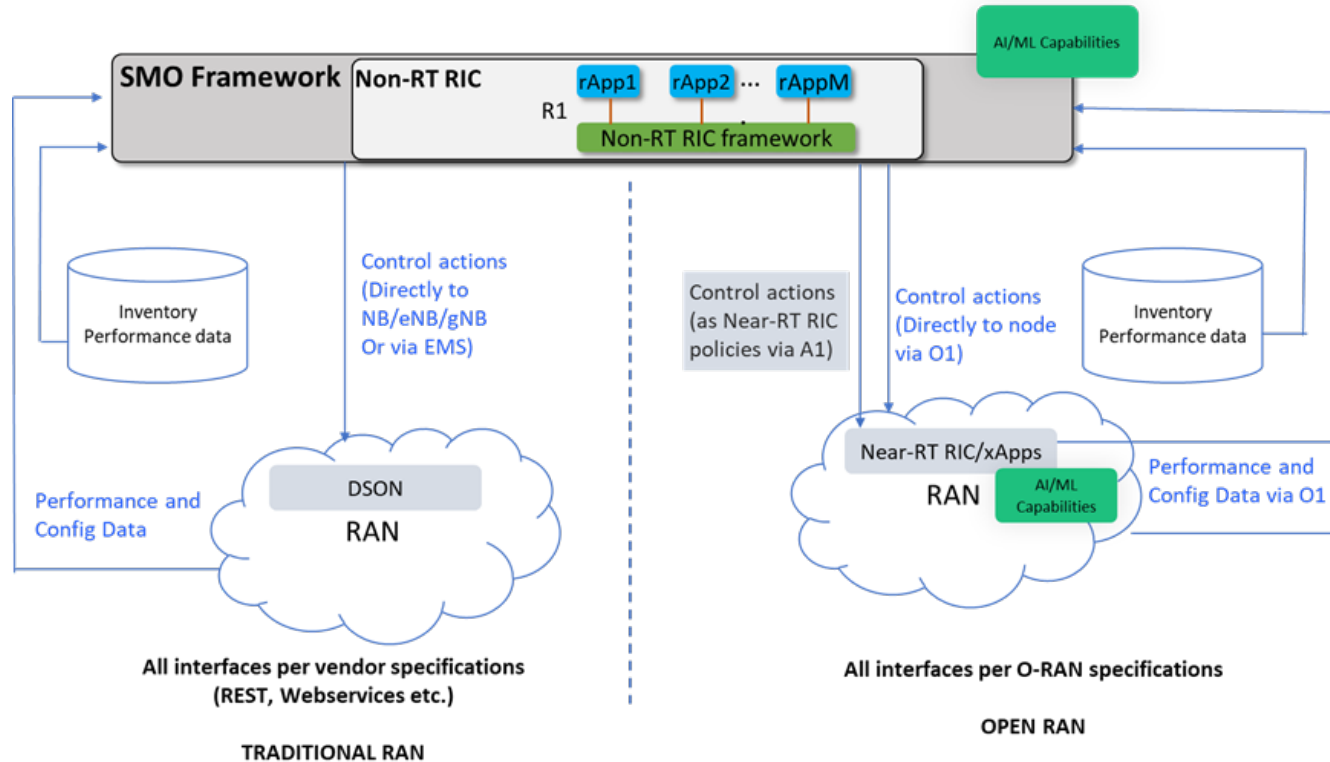
5G Energy Savings – PoC Considerations

- Problem to be considered holistically
 - RAN and Core
- Use cases:
 - Cell on/off
 - MIMO and RF channel switch on/off
 - Advanced sleep modes (ASM) – selectively deactivate components like power amplifier (PA) and others
 - SM1: PA + some digital baseband components + analog front-end (AFE) - Transition time of 71 μ s (OFDM symbol).
 - SM2: SM1 + more components of the AFE - Transition time of 1 ms (sub-frame).
 - SM3: PA + all digital baseband components + all AFE except clock generator - Transition time 10 ms (frame)
 - SM4: base station retains its wake-up functionalities but almost all its components are disabled - Transition time 1s
- Core and CPU optimization (adjust voltage, clock, and shut sown selected CPU functions)
- PoCs on these use cases to be carried out in phases

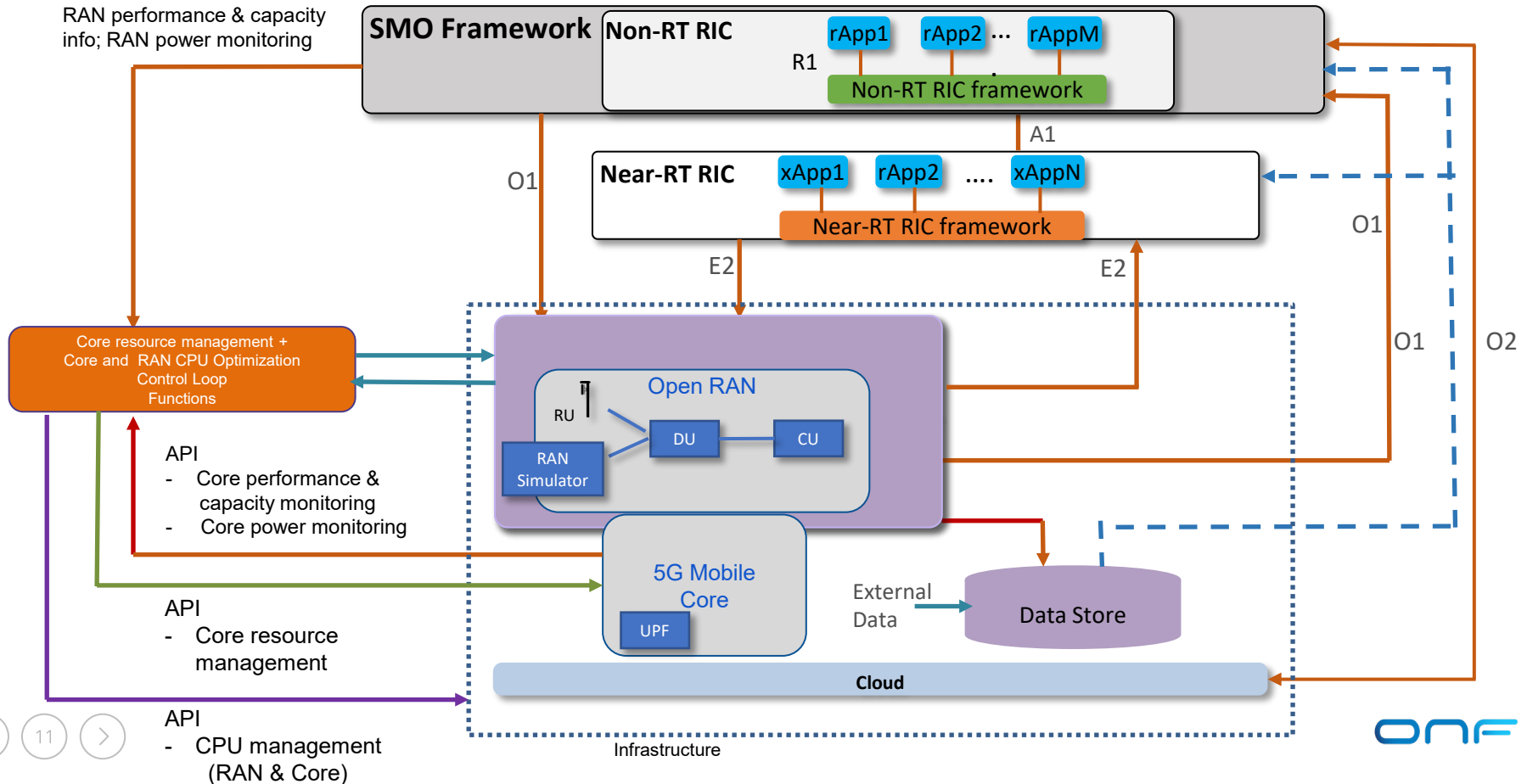
SMaRT 5G - ONF 5G Energy Savings Use Case



SMaRT-5G: Supporting Brownfield and Greenfield



Generic Architecture Supporting SMaRT -5G



Why O-RAN Architecture is a Good Option to Implement Energy Saving Solutions

- RIC has visibility to multiple radio units, CU/DU → holistic sleep/wake-up decisions
- Policy driven sleep/wake-up strategy → management of this capability easier and efficient
 - Operators can quickly change sleep strategy by just changing policy specifications
- RIC provides flexibility and control → reassuring no performance degradation
- Policy based coordination with other automation capabilities → efficient conflict resolution
 - E.g., Dynamic spectrum sharing (DSS) and energy saving have conflicting goals
 - Coordination between DSS and energy saving is efficient in the policy driven RIC environment
- Non-RT RIC is a very effective platform for AI/ML-based sleep policy creation
 - Sleep strategy could be automatically adjusted without human intervention, adaptively

Current Community – Let us Grow!



Learn more & stay in touch



About ONF

ONF has a long history of bringing together communities of operators, vendors, system integrators, academia and researchers worldwide to collaborate on projects that catalyze creation and adoption of open, disaggregated SDN-based solutions

2011

2015

2021

2022

2023+



2011

SDN and OpenFlow began a networking revolution



ONF springs out of open lab at Stanford & UC Berkeley

2015
Platform era begins



Ananki
2021

Formed to commercialize Aether platform

Ananki

2022

Sold to Intel

Adoption era begins

Late 2022

Inception of SMaRT 5G





Thank You

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