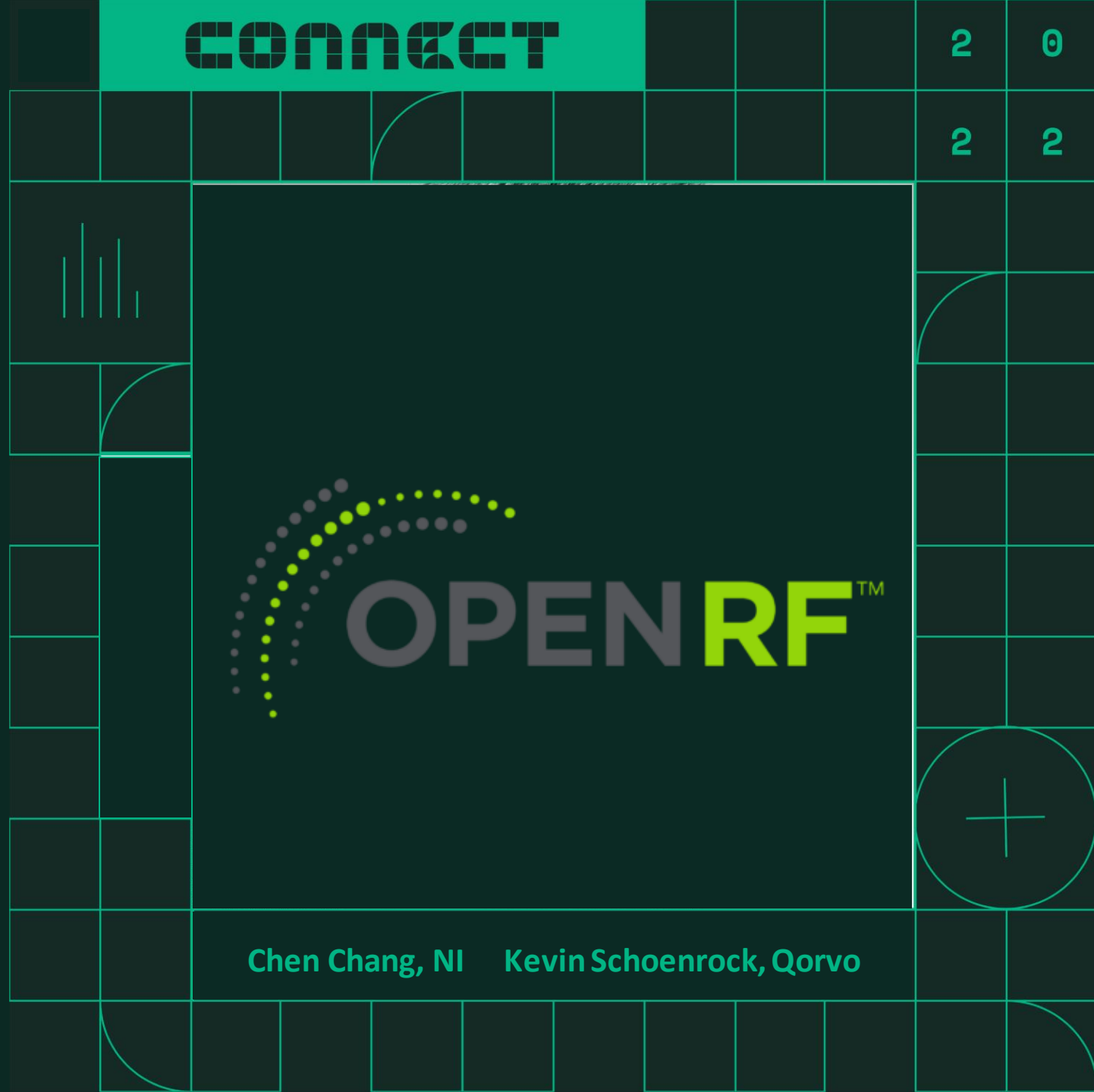
OpenRF: A Vision to Advance 5G Adoption

Wednesday, May 25th 9AM



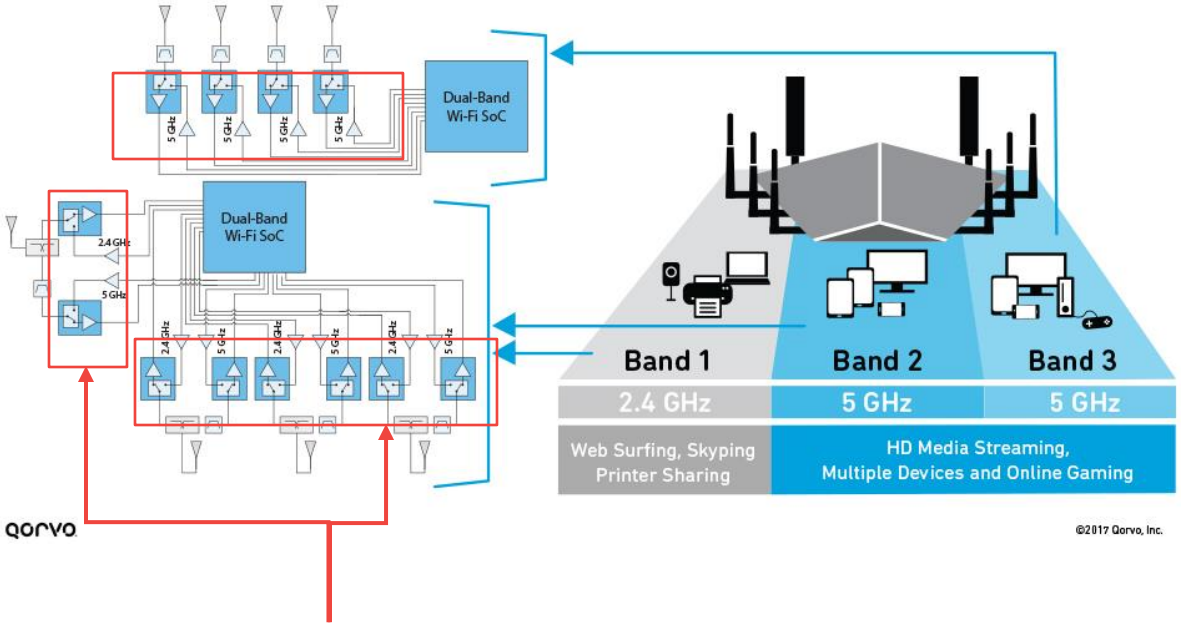
Agenda

A Vision to Advance 5G Adoption

- 5G RF Front End / RFIC Design & Test Challenges
  - Need for Open Architecture and Design Specification on RF Front End
- OpenRF Vision and Mission Introduction
- OpenRF Members and Working Groups
- NI's investment in RF Front End and OpenRF
- Call to Action: Joining OpenRF Consortium

5G RF Front End / RFIC Design & Test Challenges Today

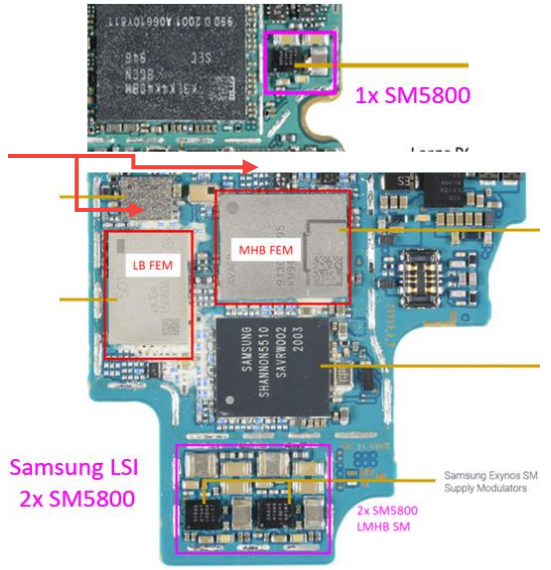
RF Front End Devices Are Complex & Critical Components of Wireless Systems



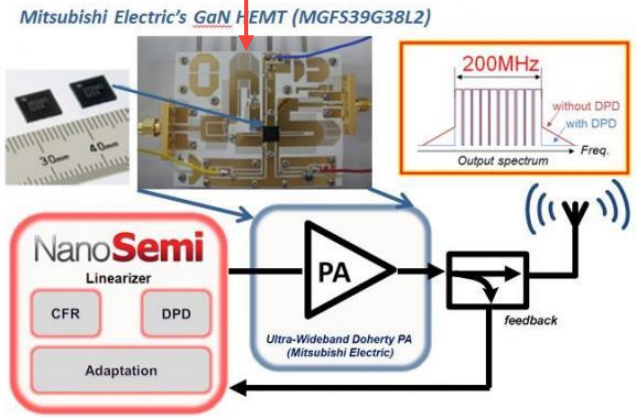
Wi-Fi Front End Modules

Cellular Front End Modules for various bands

UE



High power RF amplifier

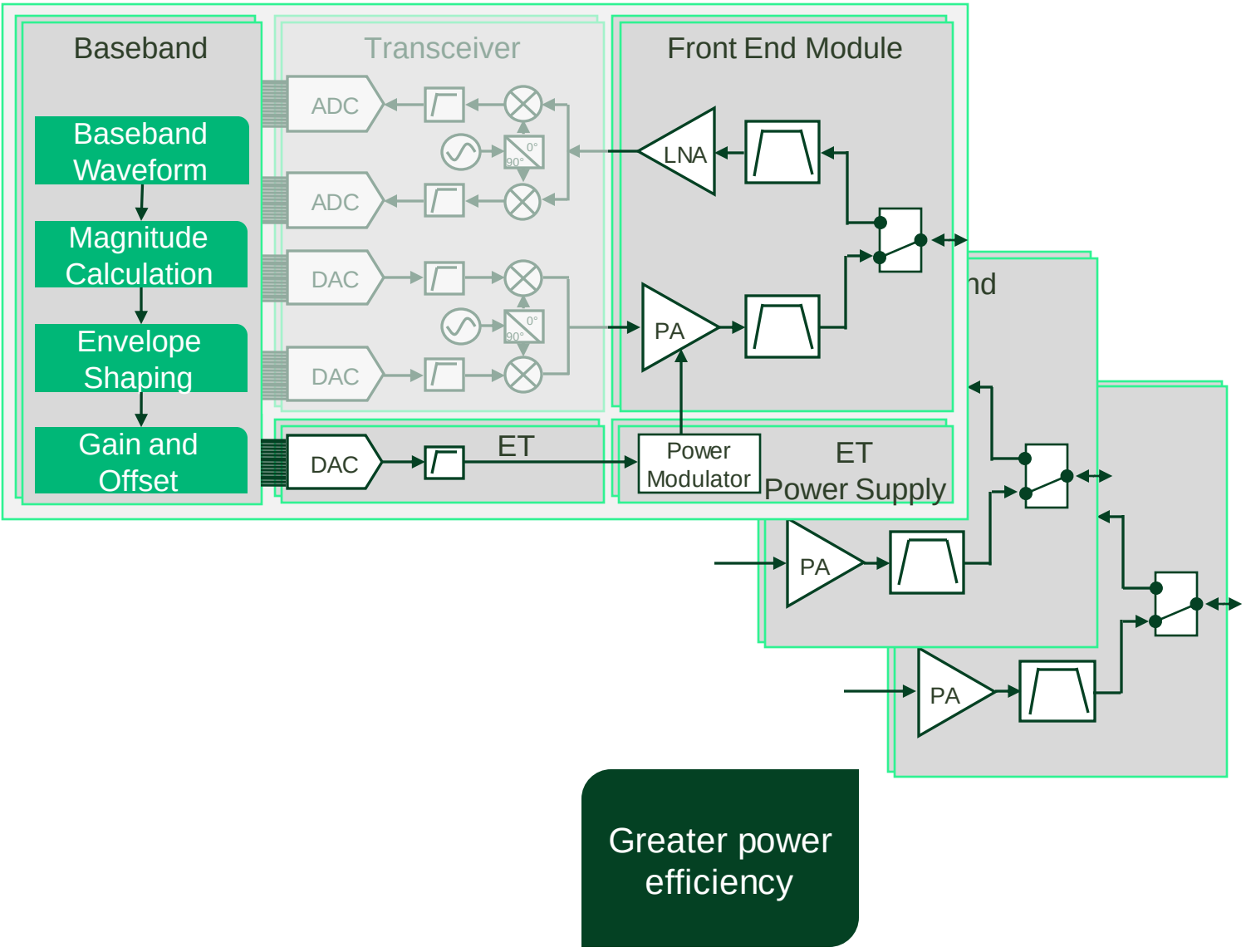


Infrastructure

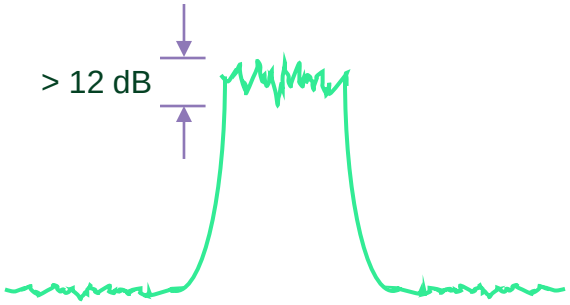
Wi-Fi Front Ends

Cellular handset and infrastructure RF Front Ends

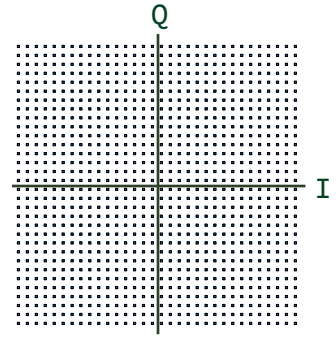
RF Front End Designers Face New Challenges



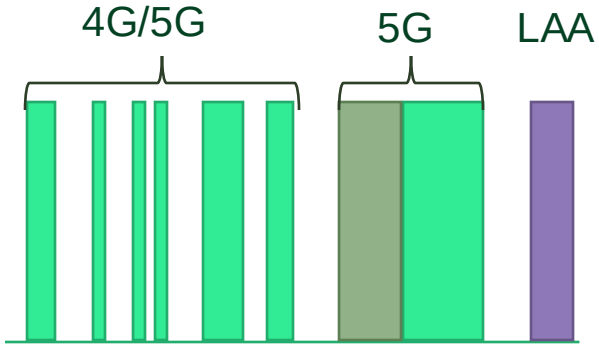
Higher peak-to-average ratio signals



Higher linearity for complex modulation



Wide, carrier-aggregated waveforms



Greater power efficiency

More Signal Chains for new bands and MIMO operation

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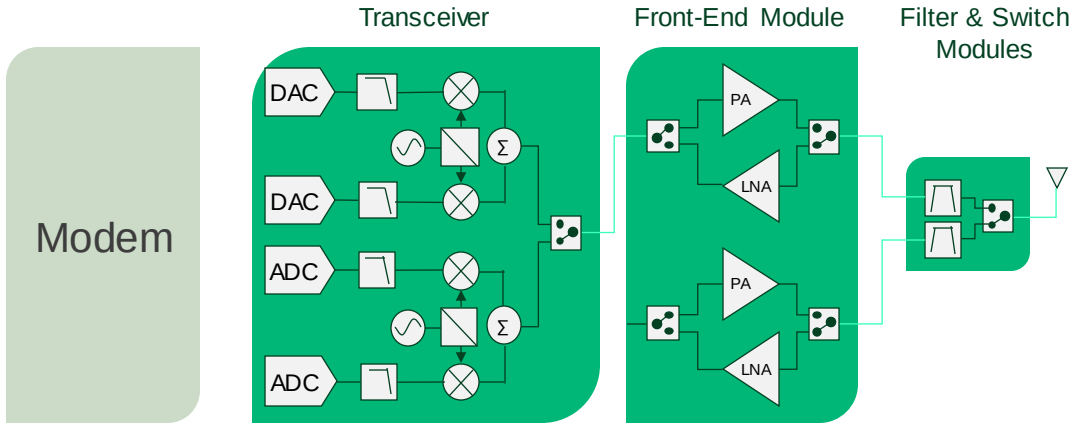
Why an open RF Architectures?

Proprietary Vertical Integration Today



Vendor A Modem

Vendor A Transceiver

Vendor A RFFE

Vendor B Modem

Vendor B Transceiver

Vendor C RFFE

Open RFIC + RF Front End Ecosystem Tomorrow

- Faster time to market
- Standardized interfaces reduces design and validation efforts
- Open competition ultimately drives the consumer market growth and technology innovation

Vendor A Modem

Vendor B Transceiver

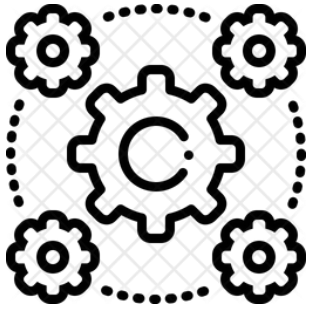
Vendor C RFFE

Vendor E Transceiver

Vendor G RFFE

Vendor H RFFE

OpenRF Vision and Mission



Interoperability

Innovation

Choice

Organize members and adjacent organizations to drive interoperability and reduce software burden, spawning innovation and open selection

Member and Adopter Benefits

TTM

CMOS, early validation

R&D

Simulation, reduced configurations

OPEN RF
UNIFIED 5G INTEROPERABILITY

Scale

Common cores

Innovation

Focus on what matters

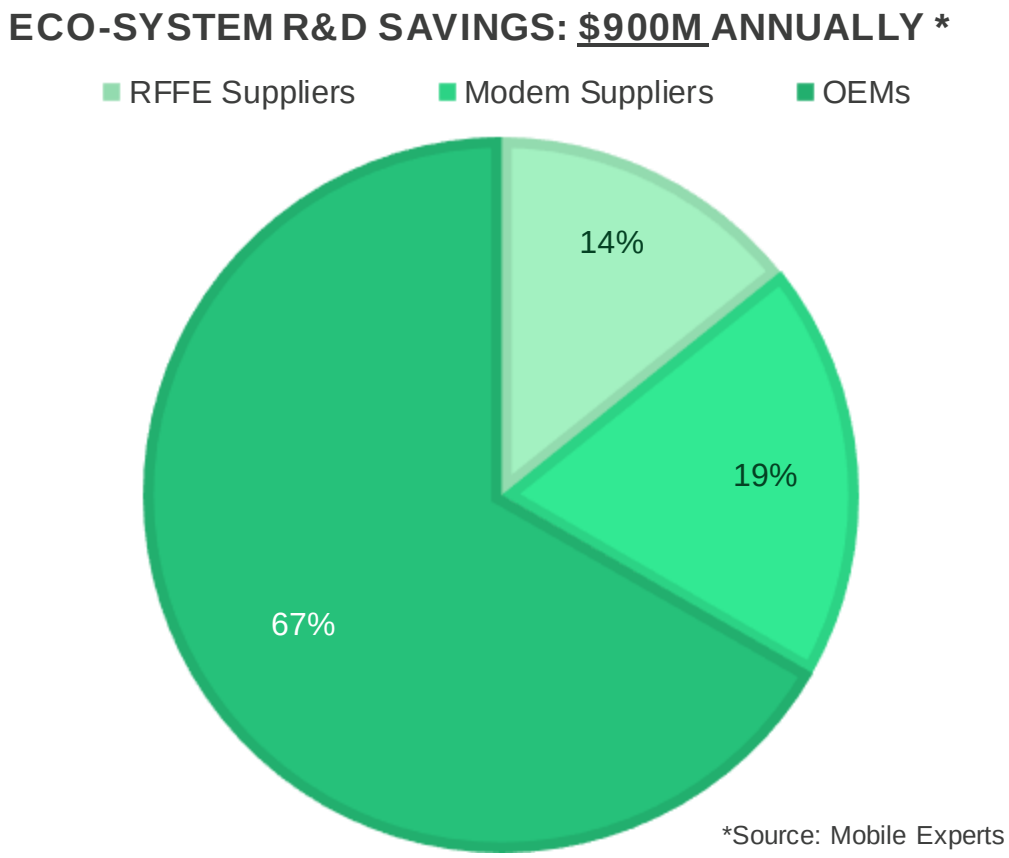
Value of Standards

5G complication has reached an inflection point requiring an ecosystem initiative

- At least 10,000 RF configurations
- Vendor-specific choices to implement RF Font End (register maps, RF drivers, interface parameters, etc.)

Value of standards time tested, across multiple industries, proving the long-term benefits for the market

- Reduce costs
- Minimize risks
- Improve efficiency
- Drive innovation



OpenRF Members and Working Groups

RF Front End
RFIC
T&M
Advisors

Hardware
Software Interoperability
Compliance

Ecosystem Membership

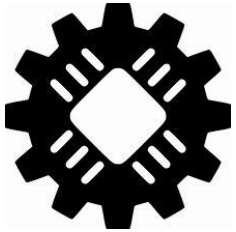
Current Members:

Membership Review: 2 company applications

Relationships: OEMs Operator

Working Group Overview

Software



Hardware

Compliance

MISSION STATEMENTS

Create a register map framework, leveraging industry standards to maximize configurability and effectiveness of the RF Front End. Develop a common hardware abstraction layer enhancing the transceiver/modem and RF Front End interface. RFIC and RF FEM agnostic interfaced model.

Chair

Maximize a set of common RF Front End / RFIC architectural features, hardware functionalities, and power management approaches across chipsets, while enabling differentiation and maintaining an ecosystem of interoperable RF Front End functional blocks.

Chair

Develop a compliance program to support a robust ecosystem of interoperable RF Front End and chipset platforms.

Chair

Year 1 Accomplishment: Phase 1.0 Specification

Software

- HAL architecture including programming guide
- Standardized register maps supporting HAL / API interfaces
- RFFE C/C++ functions interfacing w/ lower RFIC SW layer

Hardware

- Hardware pin naming conventions
- PMIC Interface
- RF Front End requirement
  - Interface, Functional, Performance

Compliance

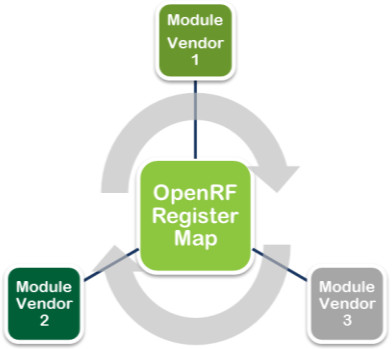
Planning and Formation

"The Open RF Association's first specification release is a significant accomplishment. A baseline for requirements and a common language are essential to the success of any new organization. This specification is the critical first step as OpenRF establishes the language for RF components and modems to speak with each other."

~ Dan McNamara, Principal Analyst with Mobile Expert

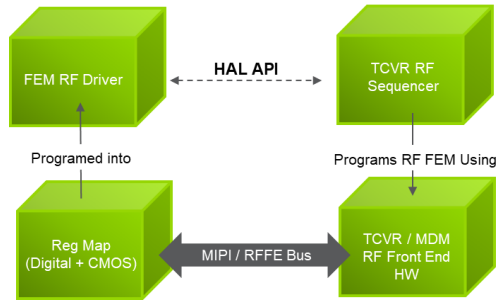
Phase 1.0 Specification Benefits for the OEM

TTM



Software Agnostic Front End
Minimized set up for multiple suppliers

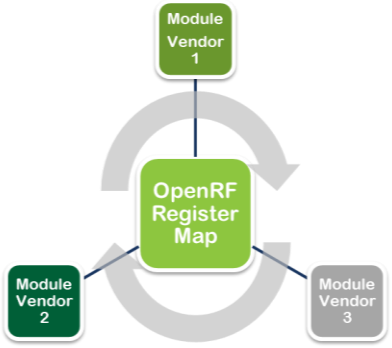
R&D



Device class template, CMOS spins reduced
HAL reusable SW driver, ease App development

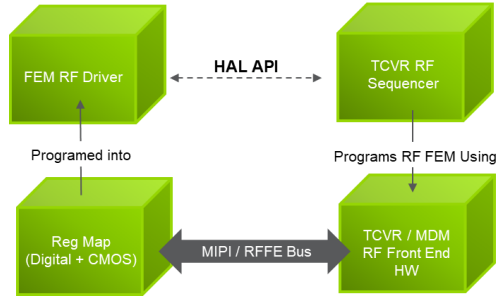
OPEN RF
UNIFIED 5G INTEROPERABILITY

Scale



Multi-source product cores
Adopt controls, same RF Front End all platforms

Innovation



HAL programming model
System performance benefits and features

Year 1 Accomplishment: 5G User Curve Study

Learn

Initial Phase

- Identify use cases, define normal 5G operation
- Gather data, create initial usage curve
- Determine data gaps, create update plan

Analyze

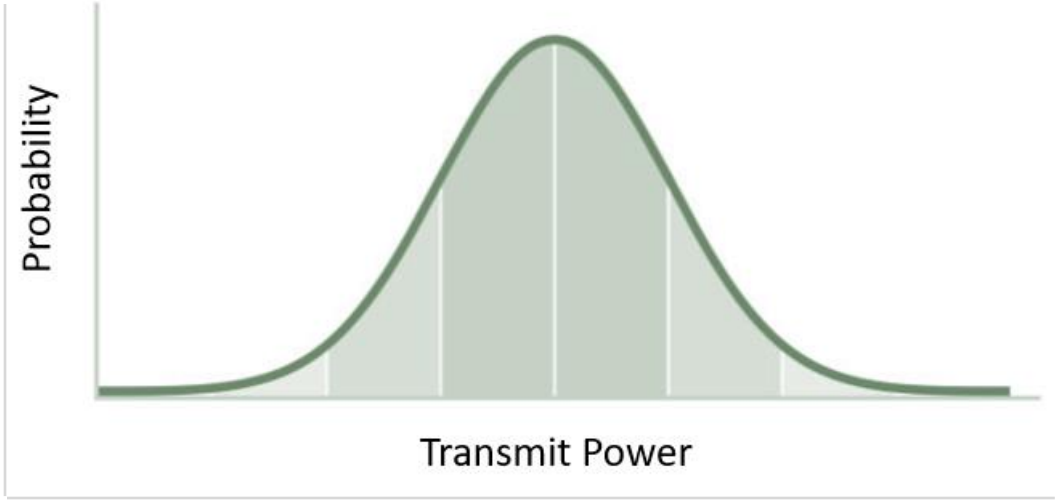
Next Phase

- Gather additional data
- *Solicit industry engagement*
- Update usage curve, analyze data

Reimage

Future Opportunity

- Best-in-class industry solution
- Industry performance and scale



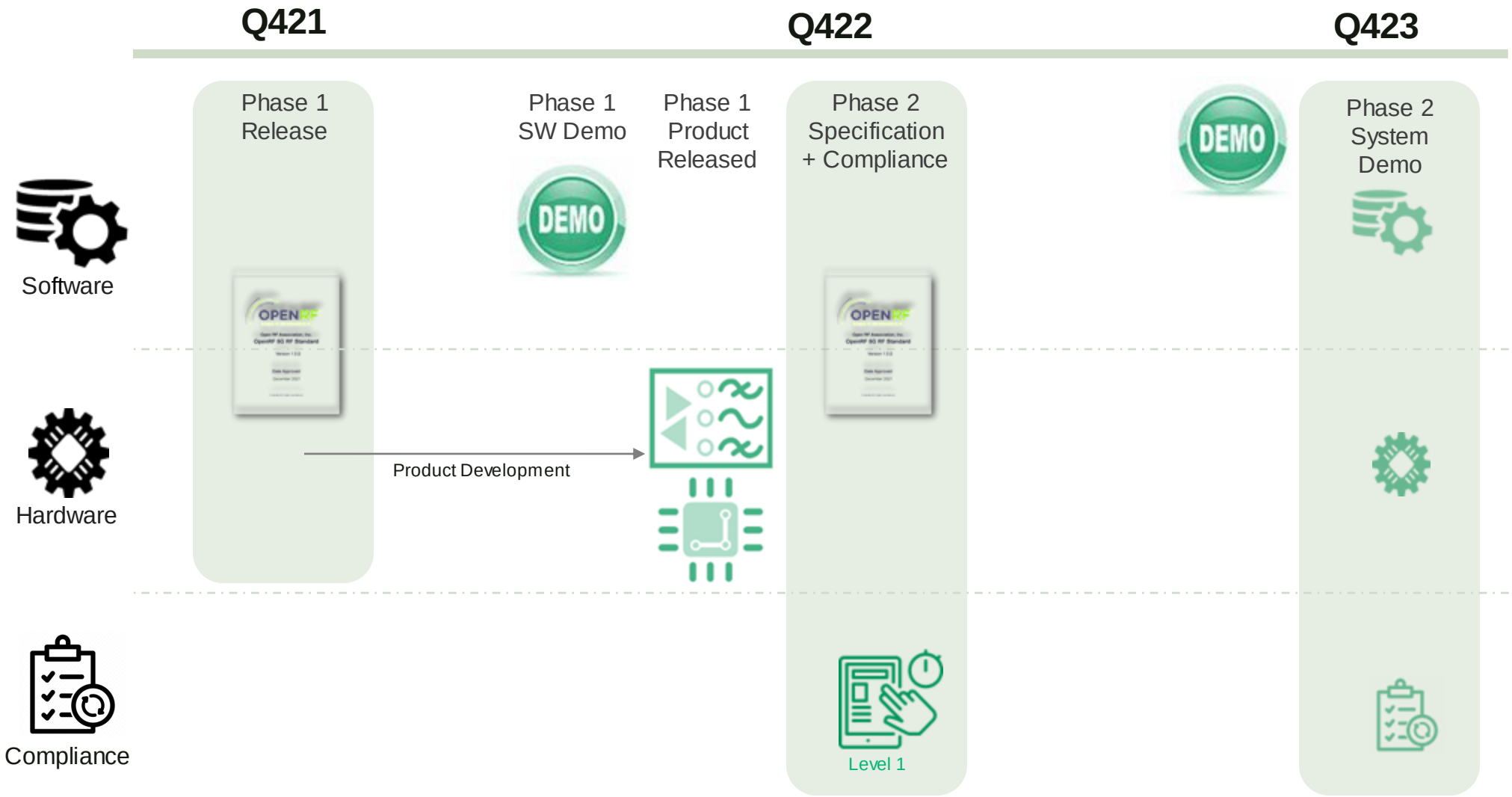
https://openrf.com/wp-content/uploads/2022/03/OpenRF_5G-Study-Press-Release-FINAL.pdf

5G User Curve Press Release

"With the field data collected from a commercial 5G SA network and the detailed analytical work that Signals Research Group performed on behalf of OpenRF, there are now 5G PA characterization profiles in place. These profile curves will greatly benefit OpenRF and its member companies."

~ Mike Thelander, President of Signals Research Group

What's Next…


Q421
Q422
Q423
Phase 1 Release
Phase 1 SW Demo
Phase 1 Product Released
Phase 2 Specification + Compliance
DEMO
DEMO
Phase 2 System Demo
Software
Hardware
Compliance
Product Development
Level 1

NI's Investment in RF Front End and OpenRF

Call to Action

Join OpenRF: Together We can Drive an Open Ecosystem in Wireless RFIC / RF Front End chipsets

- NI is the leading T&M vendor for RF Front End validation and production test
  - NI's best-in-class RF performance with industry leading test time has helped leading RFIC & RF Front End vendors to achieve faster time-to-market and higher revenue growth
- Wireless communication industry is at the crossroad of several key challenges
  - Vertical integration vs. open standards
  - China semiconductor ecosystem vs. US and rest of world
- OpenRF alliance provides an alternative solution to vertical integration on the wireless chipset supply chain

NI Strategic Business Development Director Joins Open RF Association Board

April 05, 2022 11:05 AM Eastern Daylight Time

BEAVERTON, Ore.--(BUSINESS WIRE)--The Open RF Association (OpenRF™), an industry consortium dedicated to creating an open 5G ecosystem of interoperable hardware and software across member multi-mode RF (radio frequency) front-end and chipset platforms, today announced that Chen Chang, Strategic Business Development Director at NI (formerly National Instruments), has joined its board of directors. NI, a leading developer of automated test and measurement systems, joins Broadcom, Intel, MediaTek, Murata, Qorvo and Samsung Electronics on the Open RF Association Board of Directors.

Working Group 5: Compliance

Mission Statement

Develop a program to support a robust ecosystem of interoperable RF front end and chipset platforms

Group Chair

Chen Chang
Strategic Business Development Director, National Instruments

VIEW BIO

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Opportunities to Engage

5G User Curve Study – Phase 2

- Data based on drive tests in the U.S, not real customer data – *need field data*
- Statistics on smartphone RSRPs in a real network
- Typical usage profiles (% of time spent on streaming, social media, browsing, etc.)
- To contribute data, please contact the Open RF Association: admin@members.openrf.com

Participation in Working Groups

- Software: Join the HAL development initiatives and ecosystem, adopt Phase 1
- Hardware: Implement Phase 1 definitions, join and influence the Phase 2 requirements
- Compliance: Join to help define compliance test specifications and drive OpenRF adoptions

Scan to join

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National Instruments
is now NI.

Scan to join