

IWPC Workshop

Reducing mMIMO System Complexity

Eric Westberg, Integrated Power Solutions

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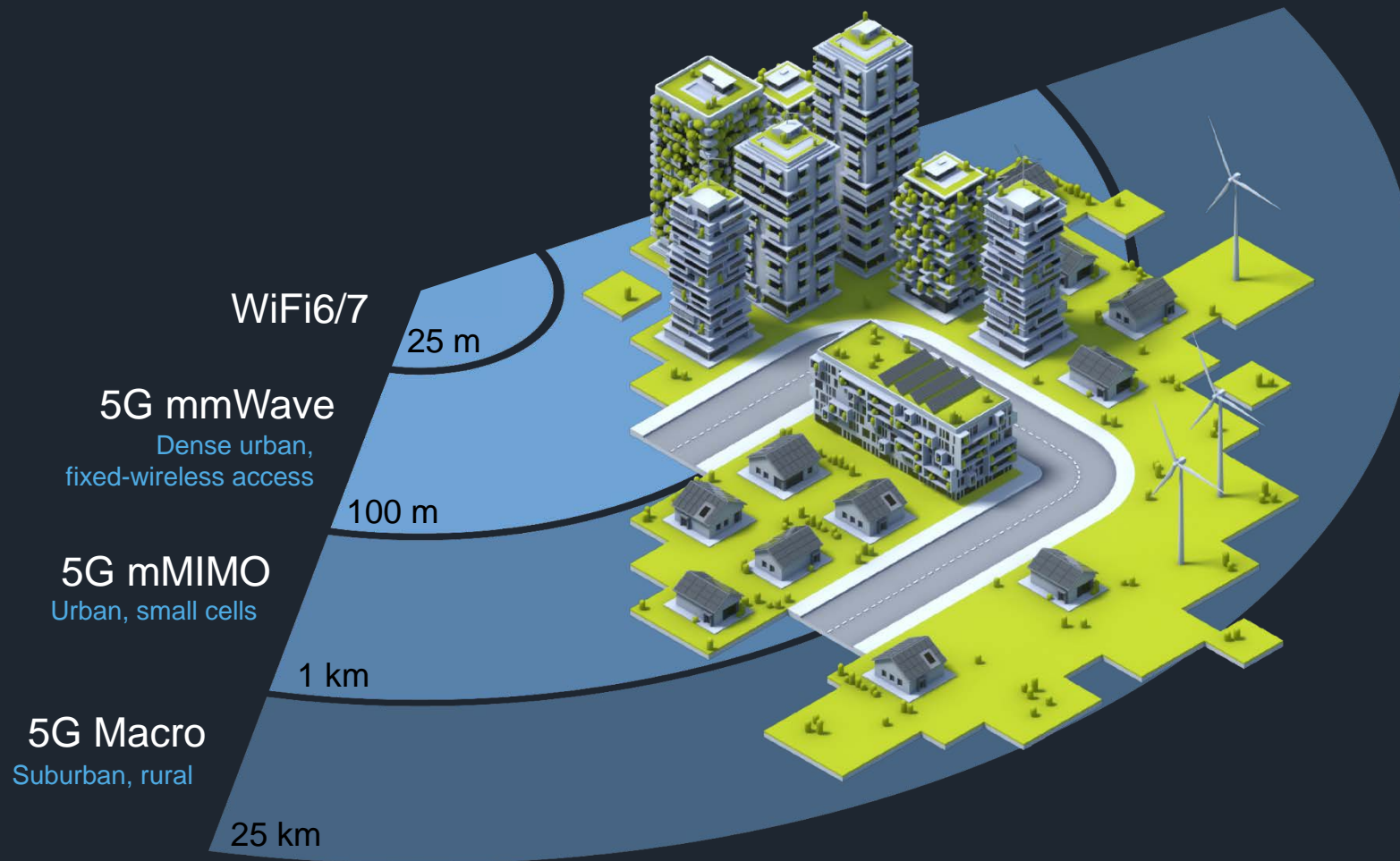


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5G IS A DIVERSE AND COMPLEMENTARY NETWORK ECOSYSTEM



MULTIPLE NETWORK ARCHITECTURES

RAPIDLY EVOLVING DEPLOYMENT

FLEXIBILITY TO RF MARKET DEMANDS

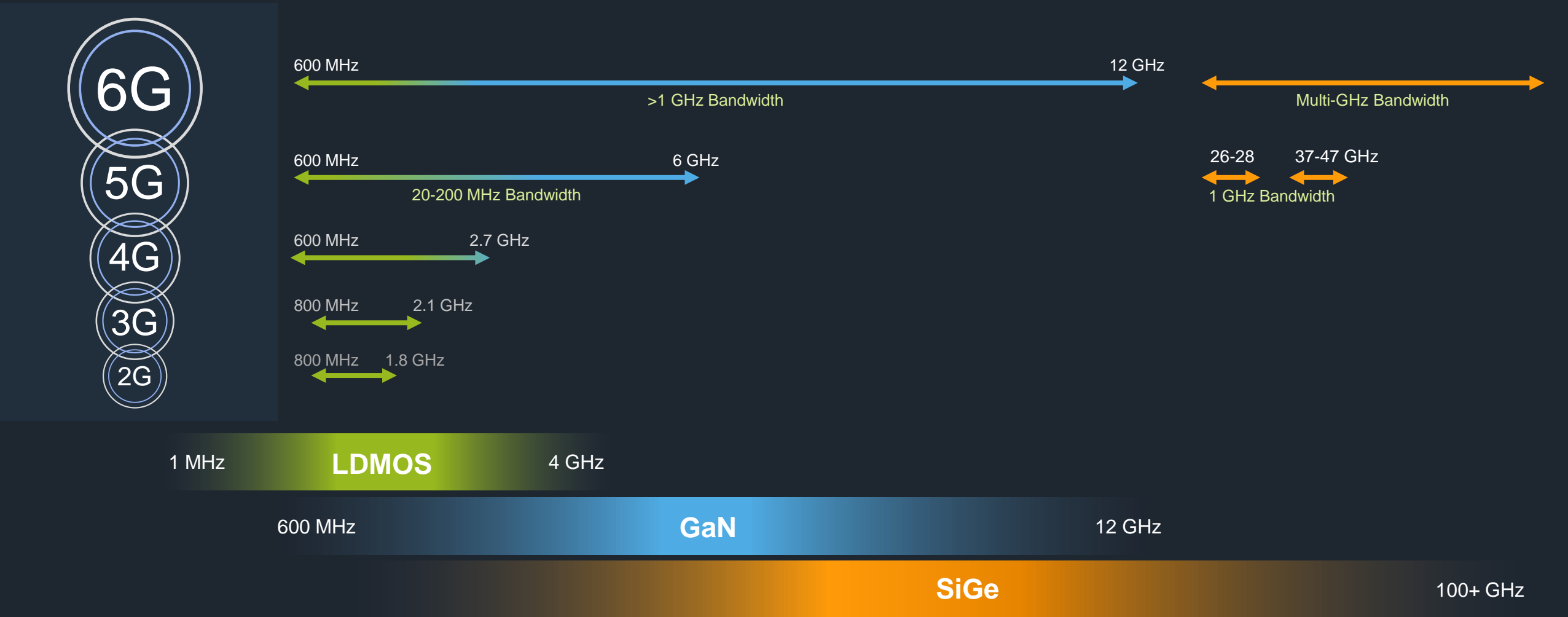
DIVERSE 5G CONFIGURATIONS

Frequencies

Power levels

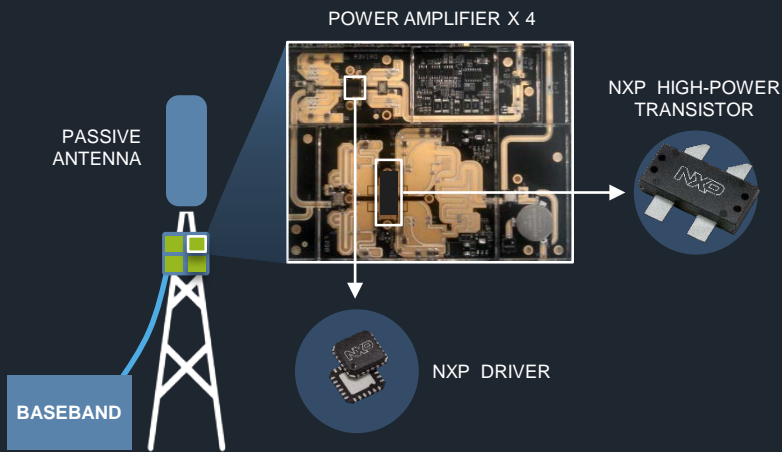
Architectures

RISING RF COMPLEXITY WITH 5G FREQUENCY AND POWER EVOLUTION

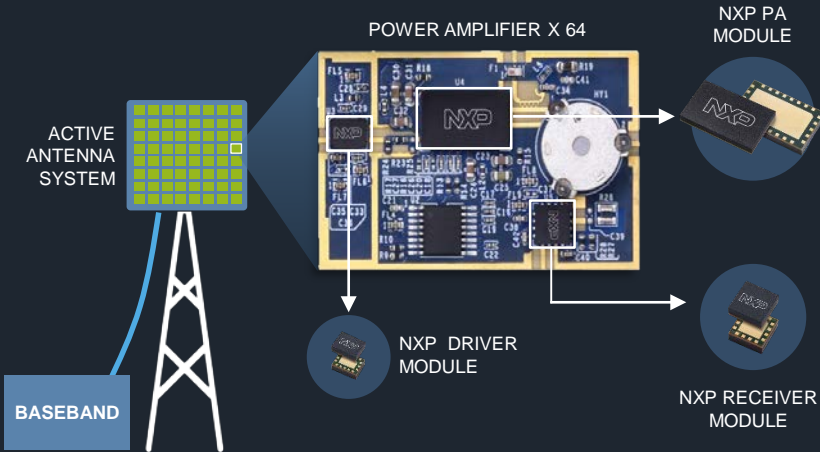


SYSTEM CONFIGURATIONS

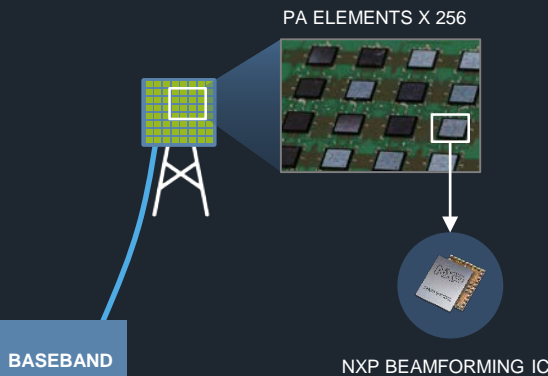
5G Macro



5G mMIMO



5G mmWave



4T

4 X 40 W

1X Content

8T

8 X 40 W

2X Content

32T

32 X 10 W

3X Content

64T

64 X 5 W

4X Content

mmWave

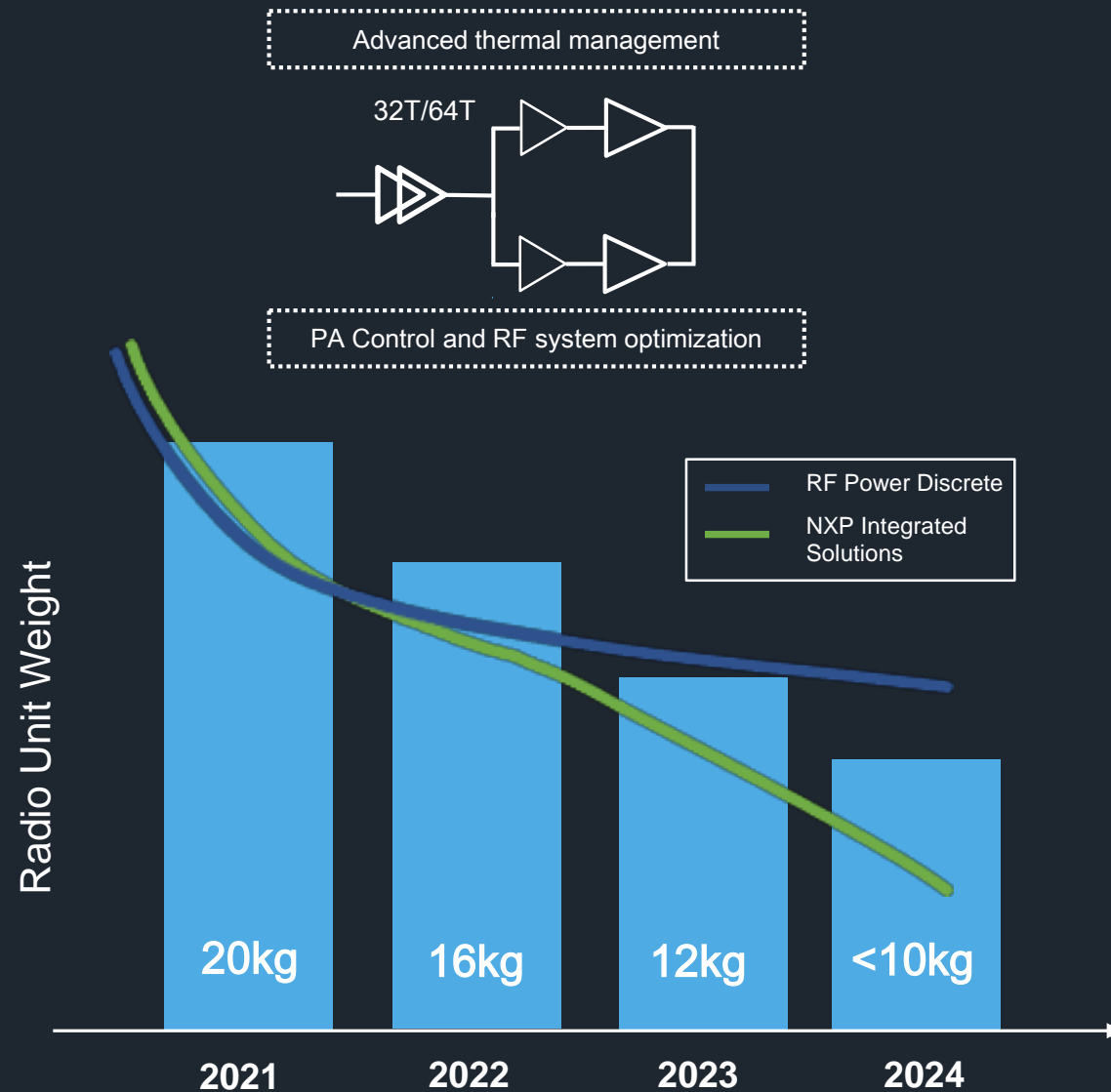
256 X 200 mW

4X Content

Coverage

Capacity

RF INTEGRATION DELIVERS BREAKTHROUGHS IN RADIO SIZE, WEIGHT AND COST



Dramatic radio size reduction enabled

20% year on year reduction

Industry leaders announcing 12kg radios

Reduced site installation costs

Simplified installations

Reduced tower loading

Improved tower utilization

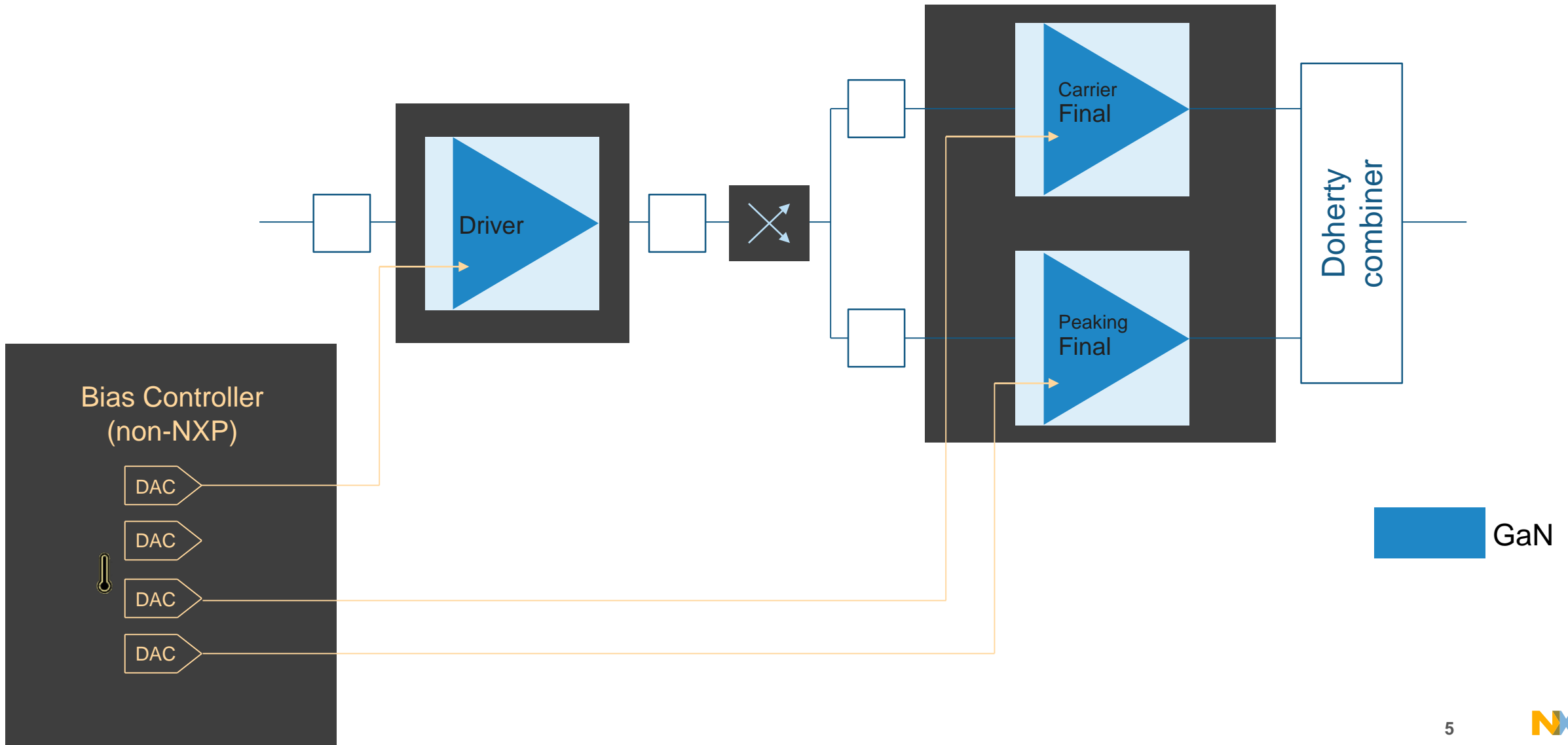
Reduced OPEX for operators

Lower site rental costs

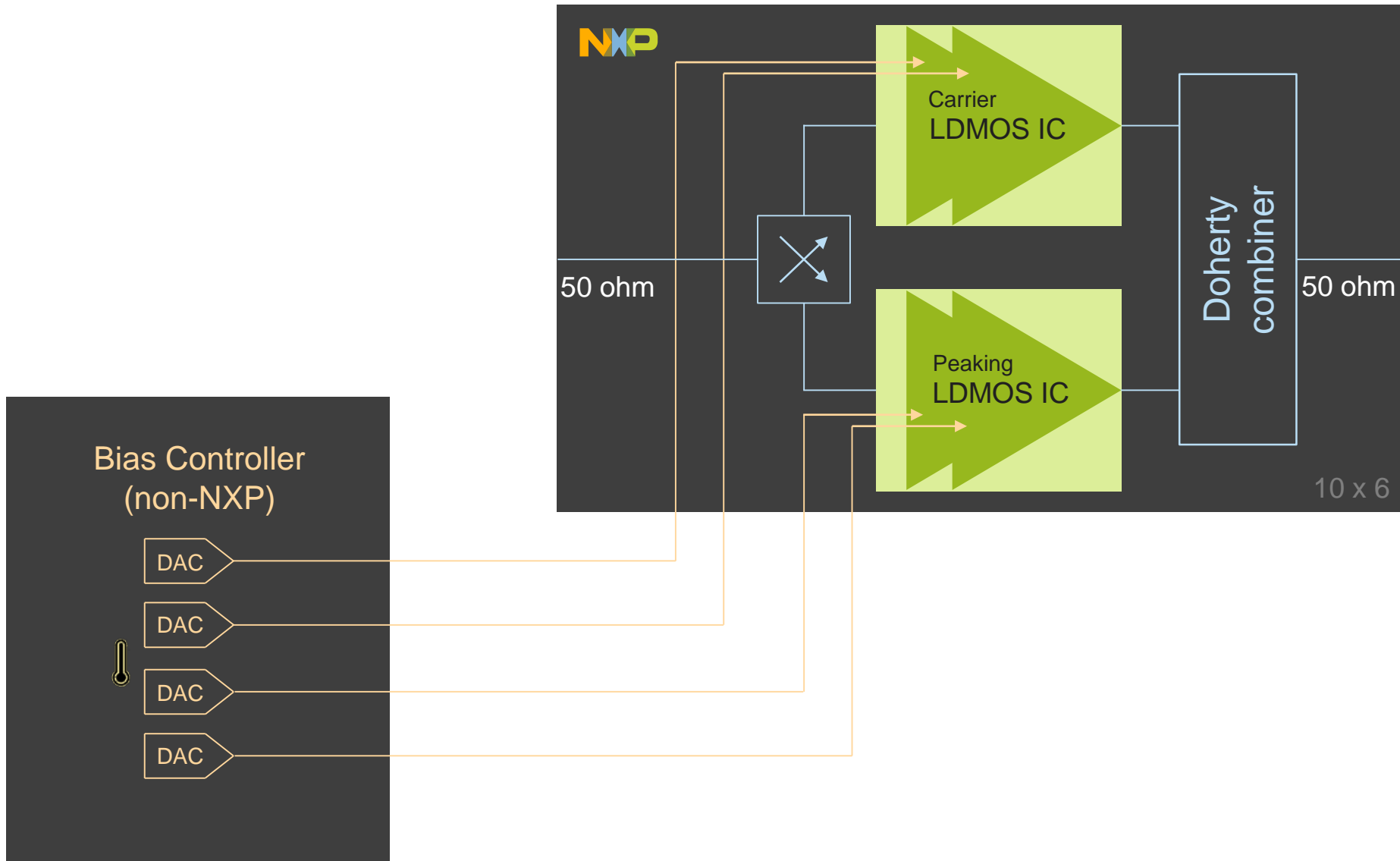
Lower energy costs

Accelerates 5G mid-band deployments

GAN DISCRETE SOLUTIONS



LDMOS MODULES



 LDMOS

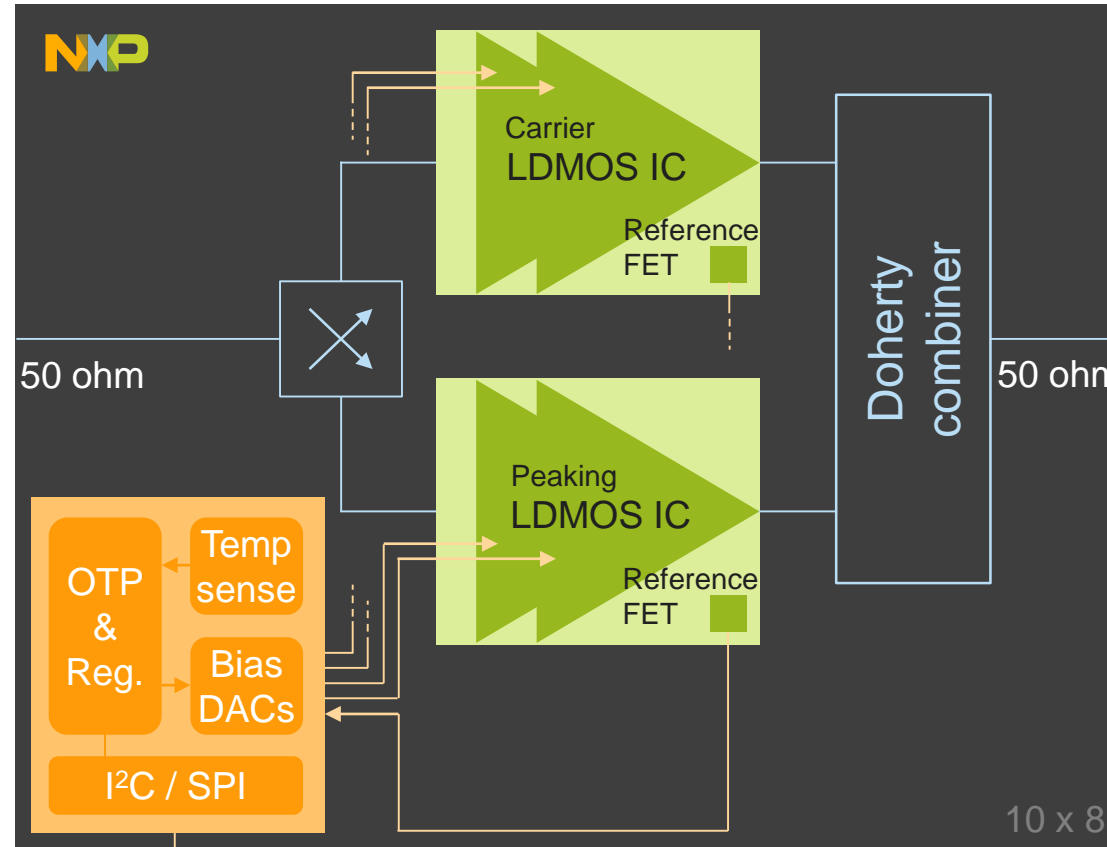
SMART LDMOS MODULES

Control

- The settings for the analog autobias are preset on the One-Time Programmable memory or adjusted by **programmable** interface

Temperature tracking

- The settings for the analog autobias can be further adjusted with **precise temperature sensor**

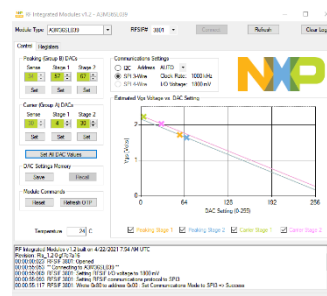


Autobias

- Reference FET** shares same properties as active LDMOS die (part-to-part variations, behavior over temperature, aging)
- Novel **closed-loop feedback** adjusts the LDMOS gate voltage to maintain a constant current density



PC GUI



Radio Software

ACCELERATING 5G WITH MULTI-CHIP MODULES

PA Features

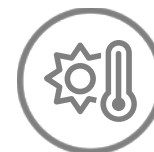
- **Common package size and pin-out**
- **Reduced BoM and PCB footprint**
- **Test time reduction, no factory calibration**
- **Optimized RF performance**

Benefits for radio manufacturer

- **Streamlined radio designs for different frequencies and power**
- **Compact solution for broadband performance**
- **Easier manufacturing and reduced system cost**
- **Future proof architecture can utilize GaN for future devices**

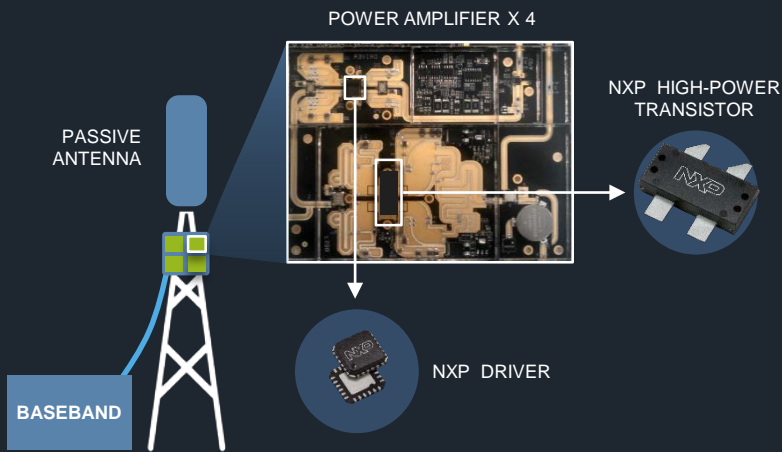
Benefits for Carriers

- **Easier 5G deployments**
- **Lighter weight equipment**
- **Smaller carbon footprint**
- **Fast deployment upgrades**

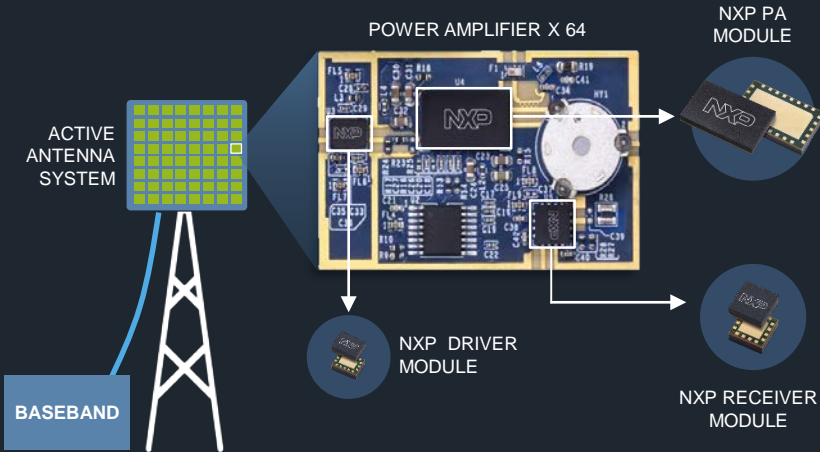


SYSTEM CONFIGURATIONS

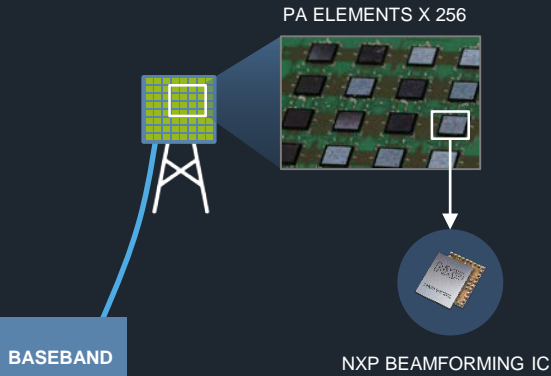
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