

SONY

HD-FDD technology for future proof 5G eRedCap

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Altair



The Sony Group

Electronics						Entertainment		Finance
Mobile communications	Game & network services	Image products & solutions	Home entertainment & sound	Semiconductors	Others	Pictures	Music	Finance Service
								
Internet Service Mobile phone Network service	Software Entertainment system	Medical Professional solutions Digital imaging products	Video Audio Televisions	Semiconductors	Recording media Battery Disk manufacturing	Media networks Television Production Motion pictures	Visual media and platform Music Publishing Recorded music	Bank Non-life insurance Life insurance

Leading The IoT Innovation

One time use parcel tracker



Vehicle Telematics



Gas



Water



Electricity



Heat



CPAP



Glucose Monitor



Autoinjector



Kid/Adult Personal Assistants

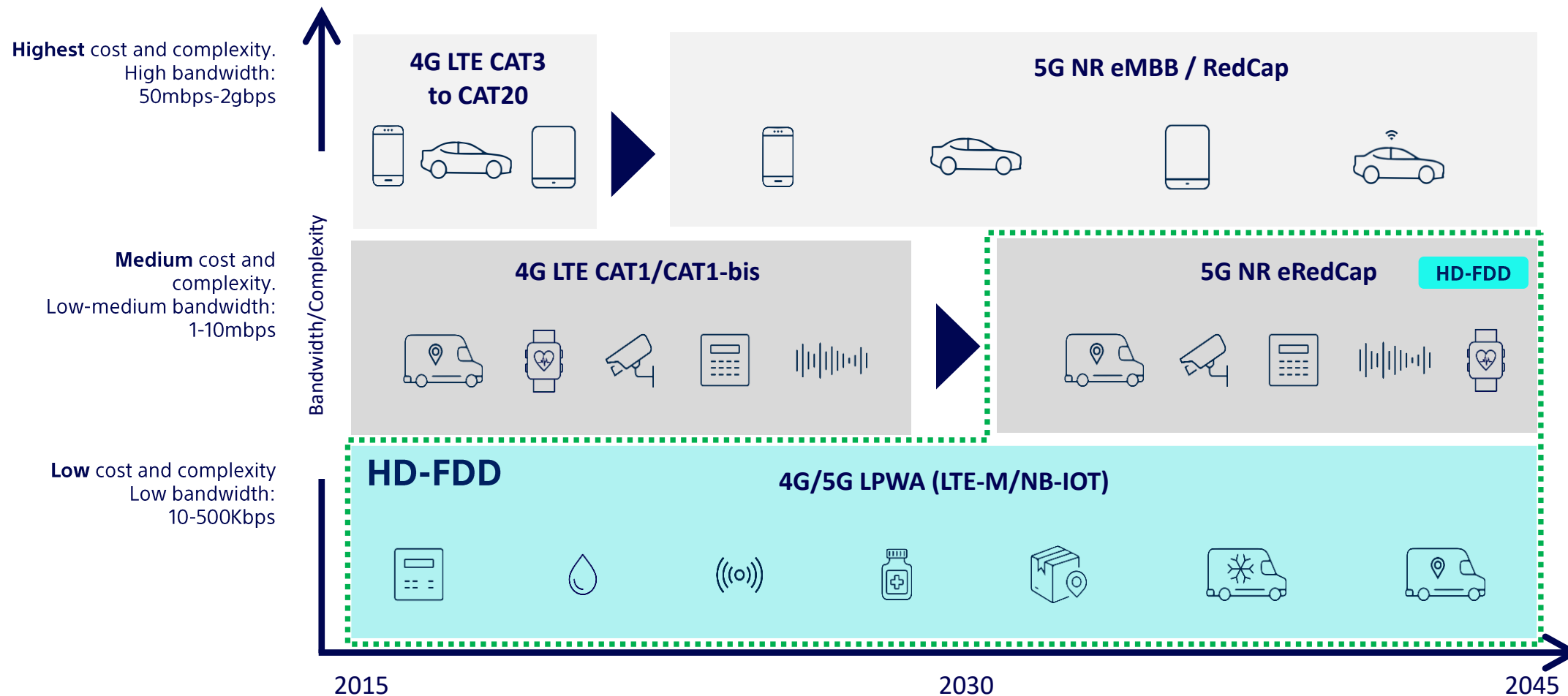


Sport Wearables



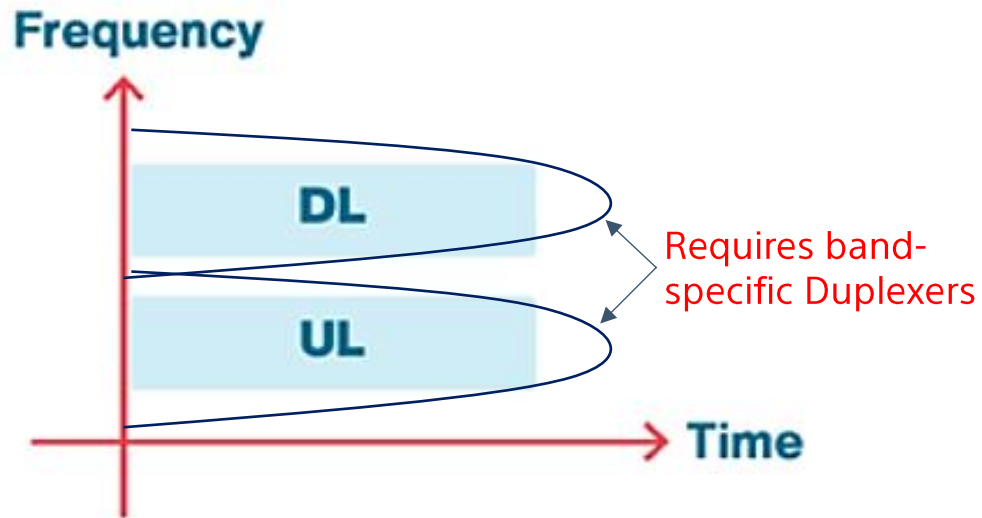
Cellular Technologies Direction and Schedule

LTE-M and NB-IoT will be supported until 2045. CAT-1bis will be replaced by 5G NR eRedCap



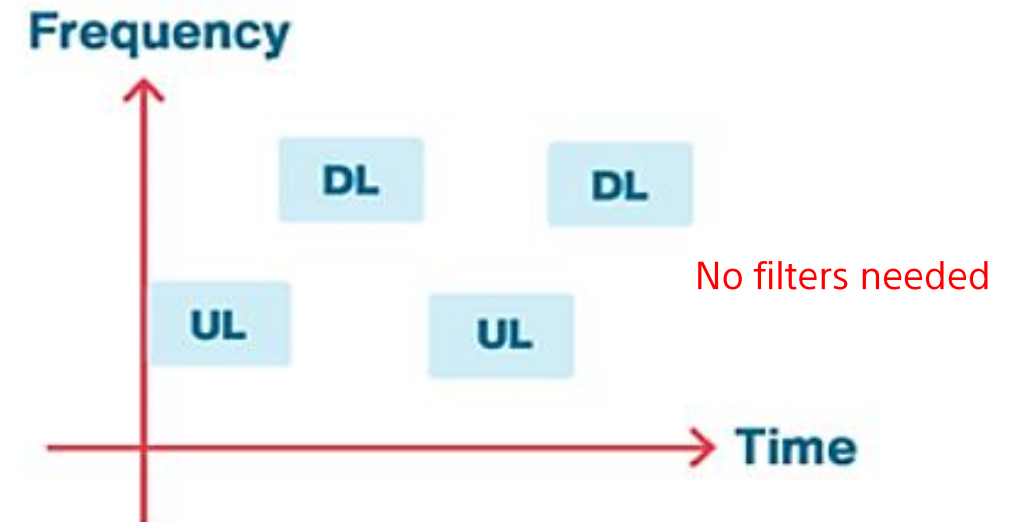
FDD vs HD-FDD – Technology Comparison

FD-FDD (Full Duplex Frequency Division Duplex)



- Uses two separate channels: one for uplink and one for downlink
- Transmits and receives simultaneously → Require duplex filters for channel management

HD-FDD (Half Duplex Frequency Division Duplex)



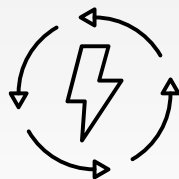
- Uses a single channel at a time for either uplink or downlink, not both
- Eliminates the need for duplex filters, reducing cost and complexity

HD-FDD Technology for IoT



Cost

Fewer RF components
→ Significantly lower
BOM cost



Power Consumption

Lower power consumption
→ Longer battery life



Performance

Fewer RF components →
Lower insertion loss →
Improved performance

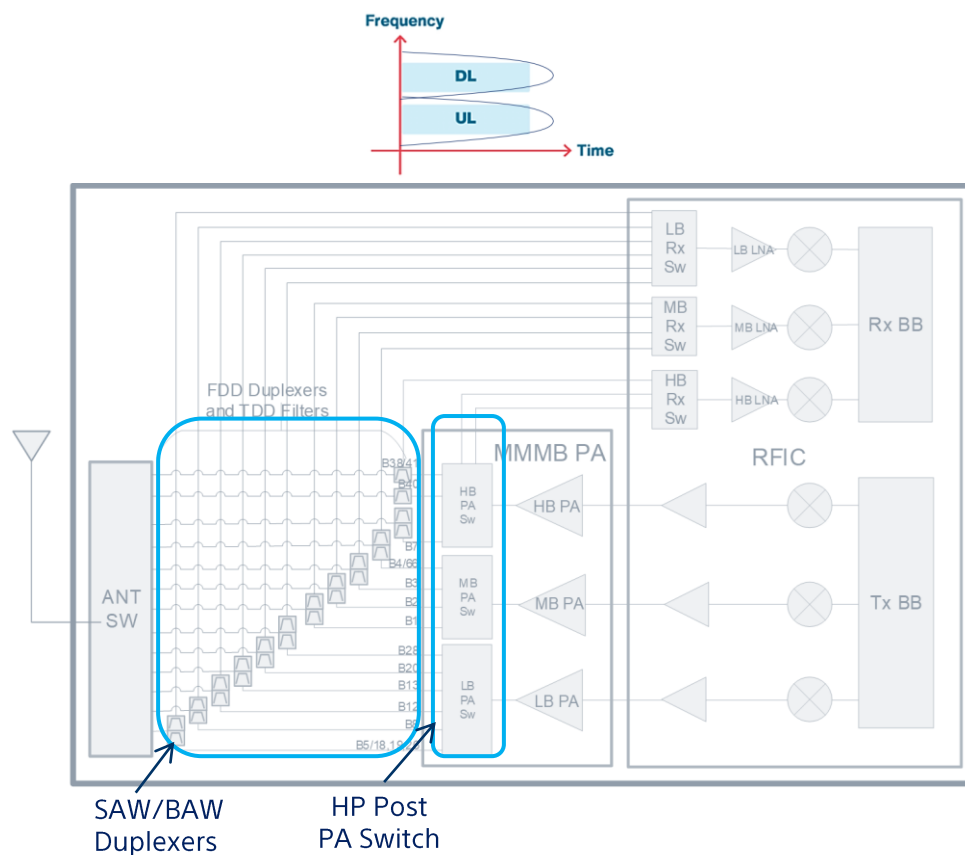


One design Global Operation

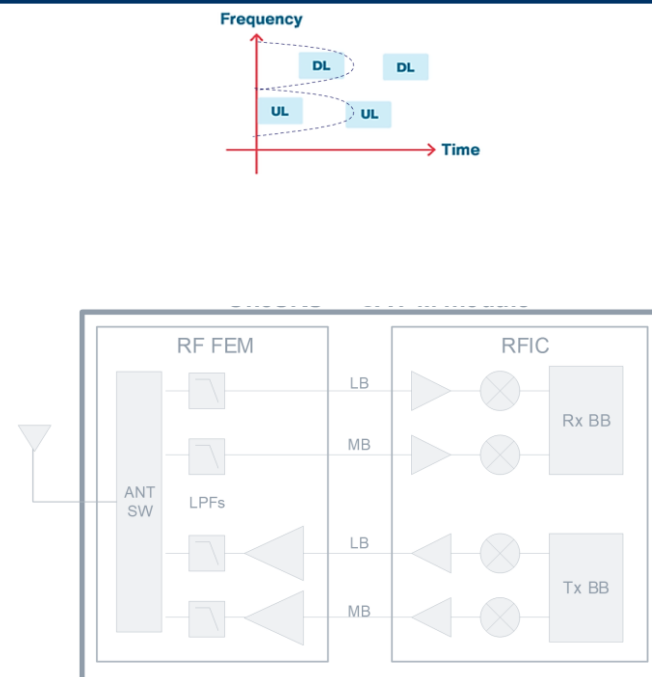
Single hardware SKU
→ Global deployment

FDD vs HD-FDD – Comparison

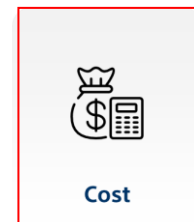
FD-FDD (Full Duplex Frequency Division Duplex)



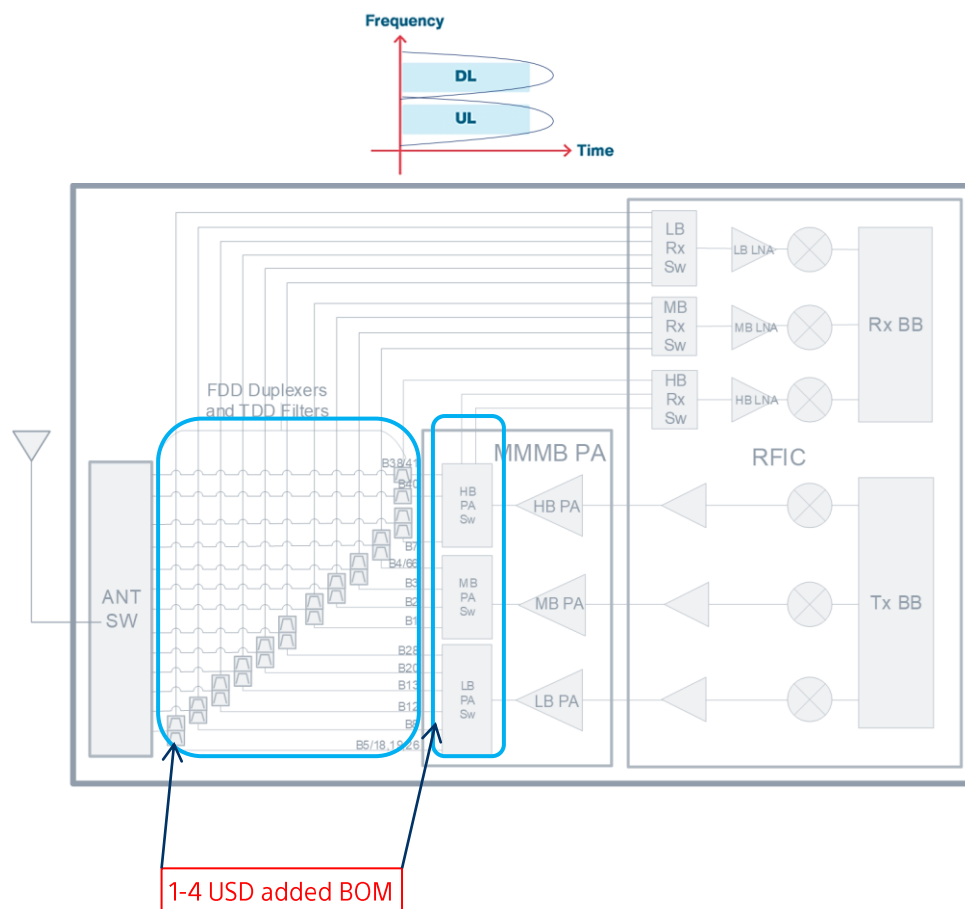
HD-FDD (Half Duplex Frequency Division Duplex)



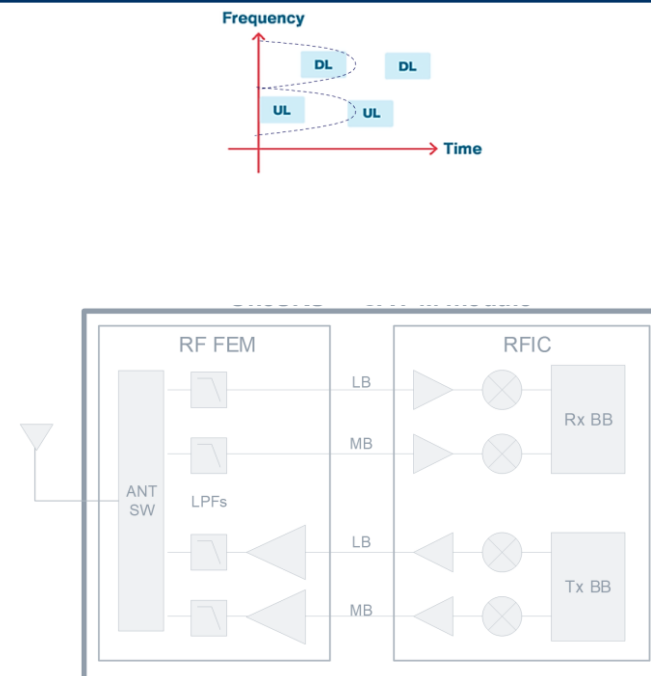
FDD vs HD-FDD – Comparison



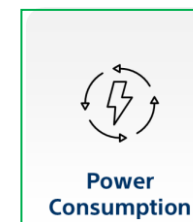
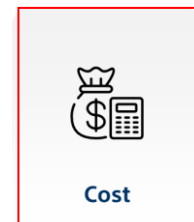
FD-FDD (Full Duplex Frequency Division Duplex)



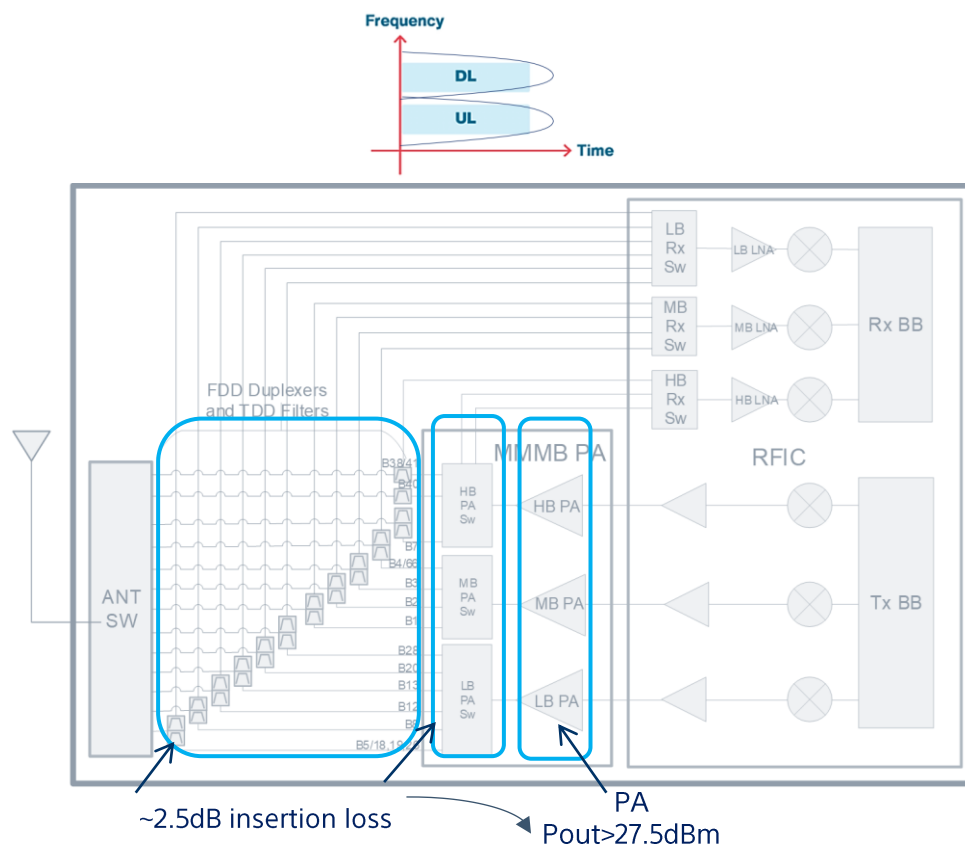
HD-FDD (Half Duplex Frequency Division Duplex)



FDD vs HD-FDD – Comparison



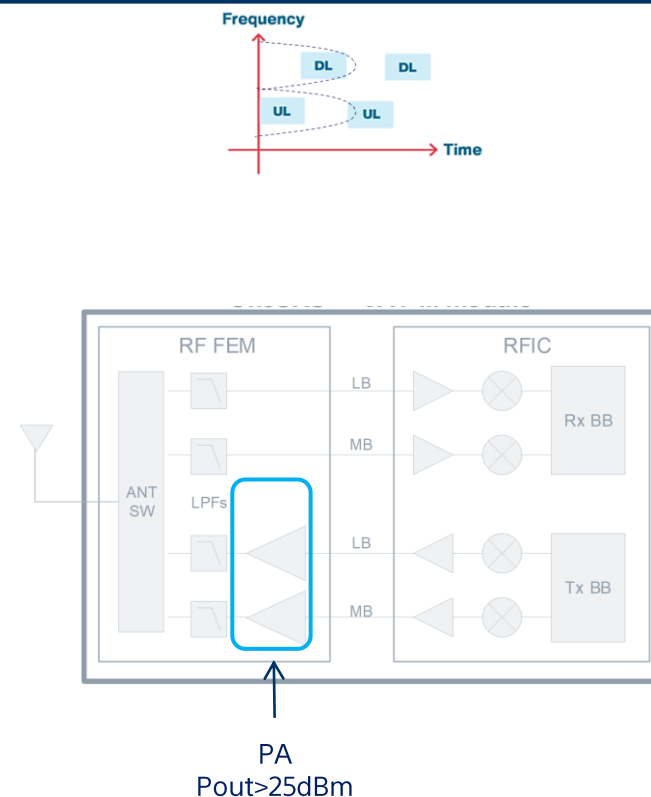
FD-FDD (Full Duplex Frequency Division Duplex)



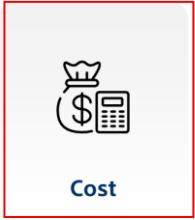
1-4 USD added BOM

Added power consumption
1) Added PA power
2) Both Tx or Rx are active

HD-FDD (Half Duplex Frequency Division Duplex)



FDD vs HD-FDD – Comparison



Cost

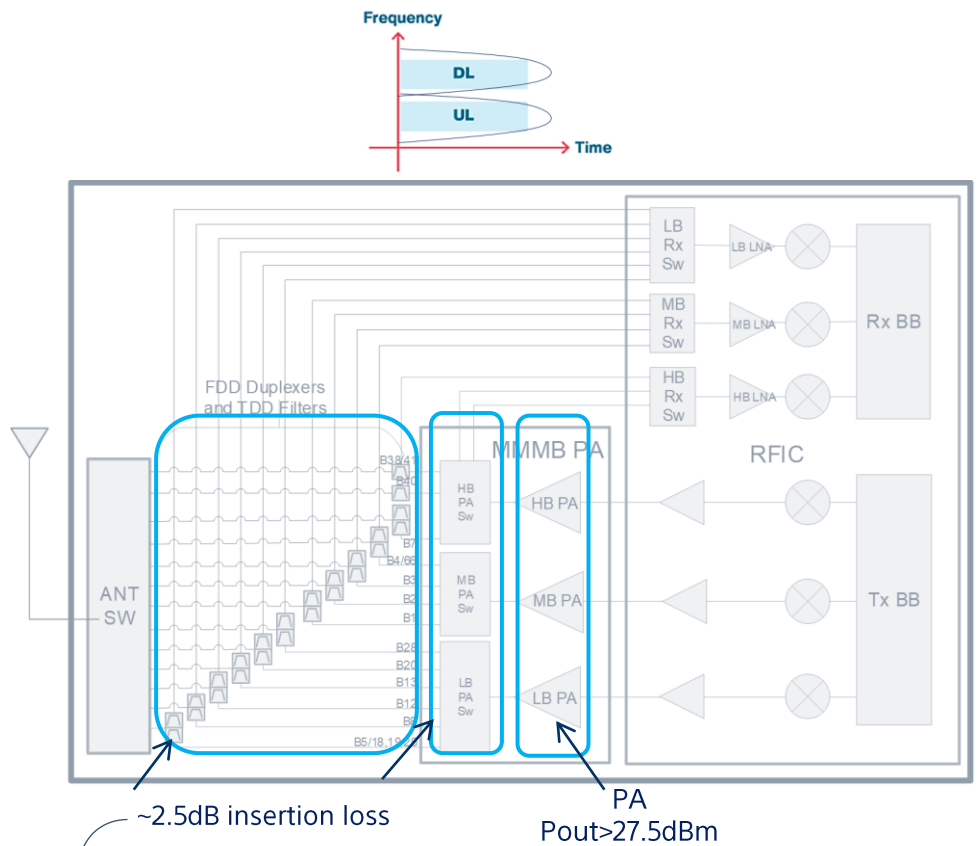


Power
Consumption



Performance

FD-FDD (Full Duplex Frequency Division Duplex)



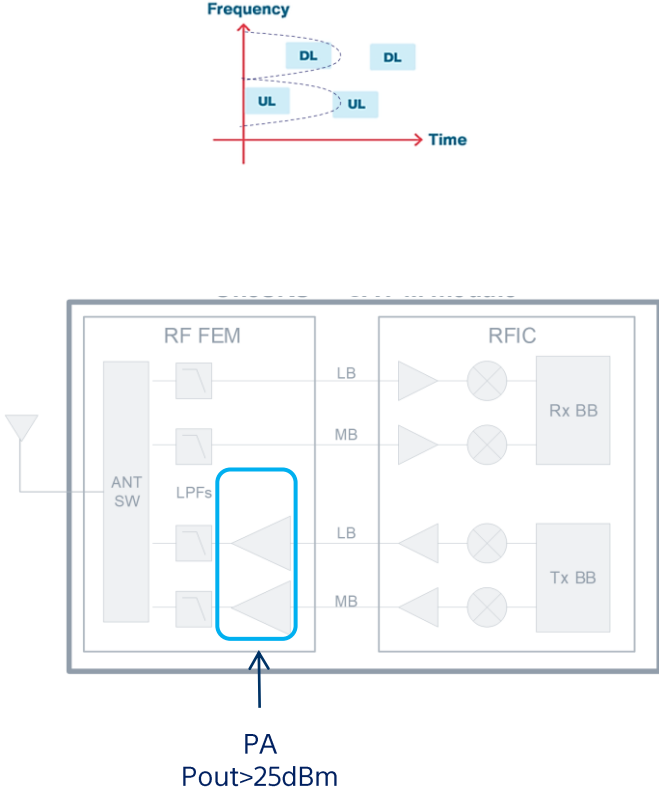
1-4 USD added BOM

Reduced SINR and coverage

Added power consumption

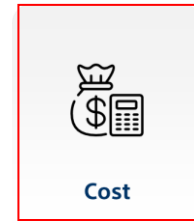
- 1) Added PA power
- 2) Both Tx or Rx are active

HD-FDD (Half Duplex Frequency Division Duplex)

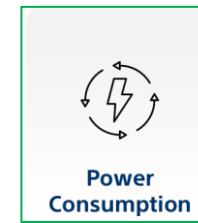




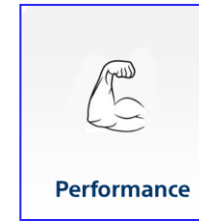
Global Coverage



Cost



Power
Consumption

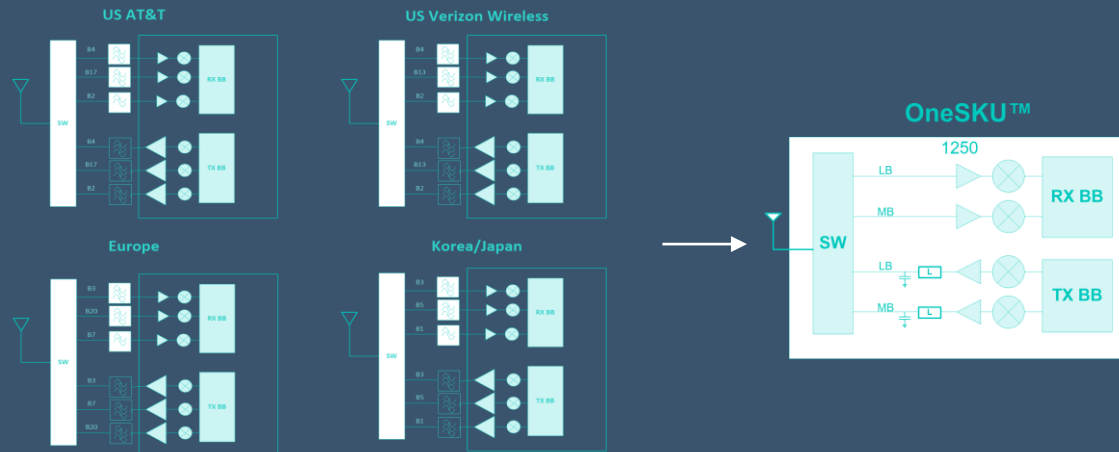


Performance



One design
Global Operation

Terrestrial coverage by one design HD-FDD global module



Enhanced coverage by satellite – NTN



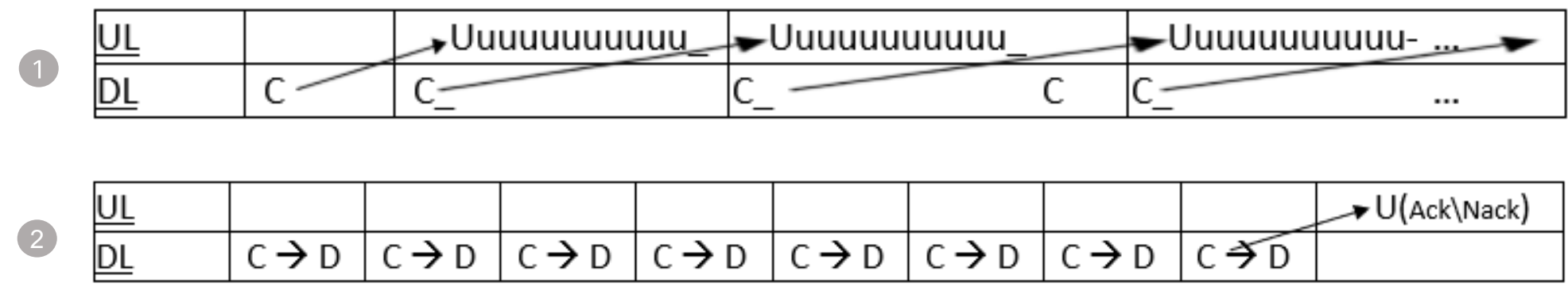
100

Network capacity: HD-FDD provides same network capacity as FD-FDD since UL/DL traffic is combined over different UEs

UE throughput for UL dominated traffic (e.g. alarm panels, meters etc): HD-FDD provides same throughput as FD-FDD 1

UE throughput for DL dominated traffic (e.g. FOTA): HD-FDD provides ~same throughput (10% less) as FD-FDD (*) 2

(*) For symmetric DL and UL scenario (little IoT usage scenarios) HD-FDD throughput is reduced to ~50% compared to FD-FDD



Observation: HD-FDD network capacity and UE throughput are kept ~same as FD-FDD for most of IoT usage scenarios (e.g. UL or DL dominated traffic)

eRedCap HD-FDD - Summary

A clear message ,communicated with key operators, test equipment and gNB vendors-

Enable and focus on HD-FDD (only) modules

- Same **network capacity** as FD-FDD, same UE throughput for most if IoT applications
- True **single module design**, allowing true economy of scale
- Small **size** module design
- No duplexers, 1-4\$ reduced **BOM** (pending FD-FDD bands chosen)
- ~2.5dB reduced **PA power** due to lower insertion losses
- ~2.5dB improved **sensitivity** due to lower Rx FE insertion losses
- ~x3 lower **power consumption** and improved **heat dissipation** due to lower PA power and only Tx or Rx active at a time

We, as industry, are facing a unique time in which we should take a bold decision to embrace HD-FDD for eRedCap

SONY



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