Software-defined 3GPP 4G/5G user equipment platform

Bringing SDR to 3GPP client equipment

3GPP 4G and 5G base station equipment is being implemented as software-defined radio by multiple software vendors. On the client (user equipment or UE) side, the industry relies heavily on custom ASIC implementations. This reliance hinders deployment flexibility, forward compatibility and speed of innovation. NXP proposes the use of a software-defined radio, solution where the L1/2/3 modem stack is implemented as C code on Arm®/x86 with a low-end RF converter.

Background

Many applications, from vending machines, industrial robotic solutions and laptop communications need wide area networking or private 5G connectivity, without the requirement for high-end Gbps level throughput. A standalone modem module can hinder these deployments through its cost, limited flexibility and lack of future compatibility.

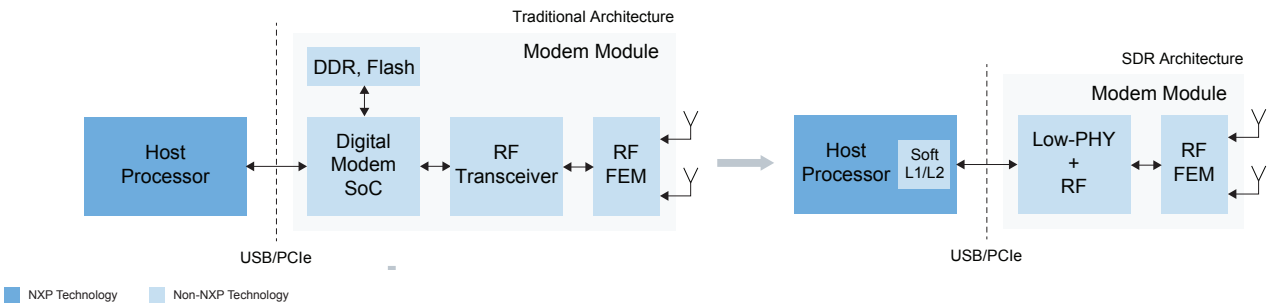
Software-defined modem

Instead of having a separate wide area networking modem, the full stack (physical layer, MAC/RLC/PDCP layers as well as upper layer stacks) can be implemented as software on the host processor, utilizing the CPU horse power that is enabled through Moore's law. This concept unlocks obvious cost/power advantages, but more so opens the stack to the software ecosystem for rapid innovation and adaptation to unique use-cases. NXP proposes a PCIe-connected front-end to enable RF connectivity.

Specifications and benefits

- Targeting 5/10/20 MHz, TDD/FDD RF
- Single lane PCIe gen 3 SerDes IO to host
- Integrated DSP for low-PHY (FFT) and digital front-end and RF control using Arm-M4
- Flexible connectivity to "any RF" front-end
- Aggressive DC power, ~1 W (LA9310 only)
- Enabled with GNU radio/open source and software partners

System architecture



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