

Pursuing The Limit of Technology
And The Ultimate of Products

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ABOUT ULTICHIP

Ultichip, a trailblazer in communication semiconductors, facilitates customers in effortlessly accessing, tailoring, and deploying wireless infrastructure.

Ultichip specializes in providing SoC solutions for wireless and communication infrastructure, encompassing baseband and protocol processors, leveraging our distinctive Application Specific Instruction-set Processor (ASIP) technologies. Our SoCs are meticulously crafted to align with O-RAN specifications, catering to the requirements of base stations. By utilizing our SoCs, telecom equipment vendors can swiftly deliver cost-effective and competitive products. Ultichip also offers comprehensive reference designs.

In addition to SoCs, Ultichip delivers micro, pico, and femto cells for OEM/ODMs based on our silicon solutions. Our customized offerings encompass integrated and distributed base stations, complete with corresponding software and firmware. Ultichip's solutions, characterized by low cost and low power consumption, play a pivotal role in enabling operators to curtail both CAPEX and OPEX.

Ultichip is pursuing the limit of technology and the ultimate of products.



TECHNOLOGY

Thousand Islet Lake - ASIP



Galois Processor



Symbol processor



Network Processor



POLAR Decoder



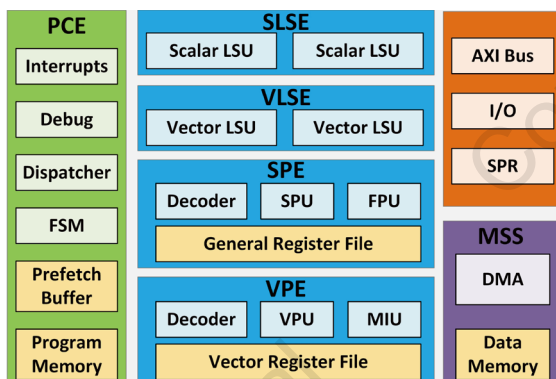
LDPC Decoder



FFT Processor

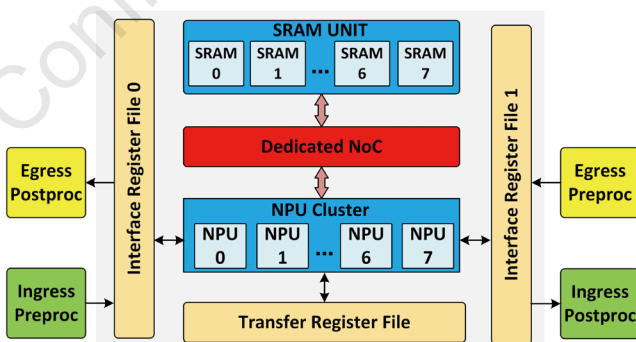
The performance of an ASIP can be tailored to approach the limits of architecture and technology, offering reduced costs, improved flexibility, and well-established programming environments for developers.

Sayram Lake - Vector DSP



- VLIW with 4 instructions issue in parallel
- 512bits data parallel vector architecture
- GCC/ LLVM based toolchain
- DSP enhancement instructions including LUT, ZC, cordic, division, interleaving, modulation, and demodulation, etc.

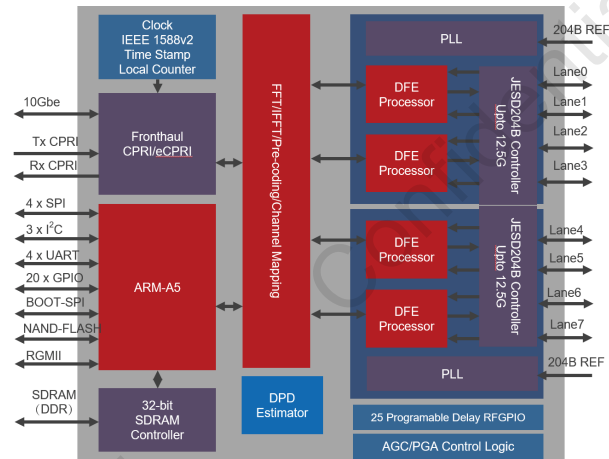
Tai Lake - Network Processor



- Data Plane acceleration, especially ingress and egress processing
- ACL and Flow Classifier
- eCPRI & CPRI dedicated acceleration
- L3/L4/L5 packet parsing
- Hard-accelerated Hash algorithm
- Data format adaptive
- DPDK

SILICONS

Meri - UC1046 Digital Front-End Device



Features

The Main function

Antenna Combination Modes

Fronthaul Interfaces

Transceiver Interface

Synchronization Modes

CPU System

Peripherals

Description

Single mode: 100MHz bandwidth, 4T4R / 2T2R
200MHz bandwidth, 2T2R
LTE, 2T2R
Dual mode: NR 2T2R and LTE 2T2R

CPRI and eCPRI fronthaul interface protocols
O-RAN specification functional split 7.x and 8

Two sets of 8 lanes JESD204B/C interfaces
The rate can reach 12.5Gbps
25 programmable delay I/Os for RF control

Hardware supports IEEE 1588V2 PTP, SyncE GPS

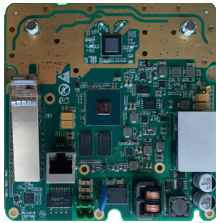
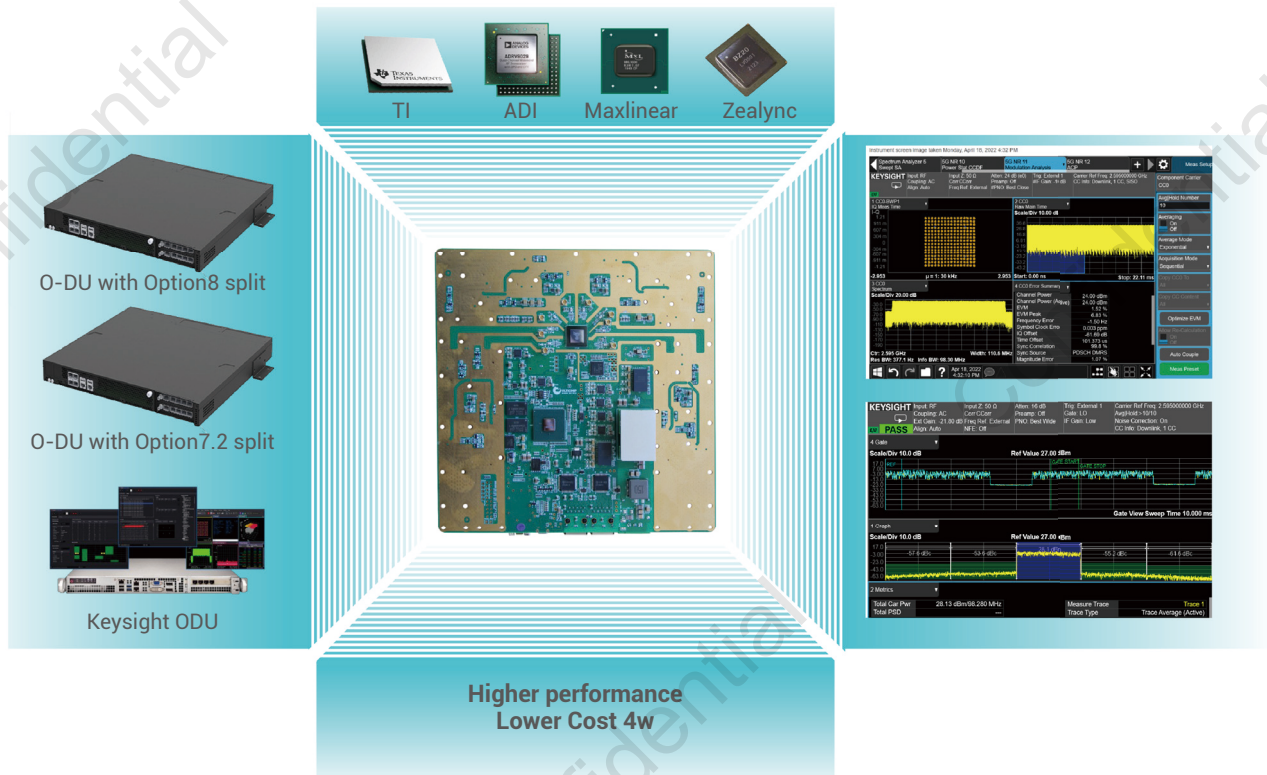
ARM processor with NEON, 800MHz
32bit DDR SDRAM
SPI NOR Flash Boot ROM
QSPI NAND Flash
1000Mbps, 100Mbps, 10Mbps Ethernet

4 SPI interfaces
3 I2C interfaces
4 UART interfaces
20 GPIO ports

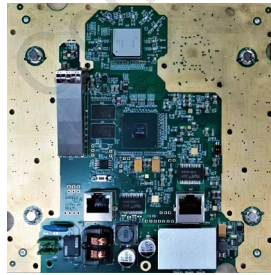
Function Descriptions

UC1046 is a digital front-end (DFE) SoC supporting 3GPP 4G/5G standard and O-RAN specifications. It's functions include carrier aggregation (CA), pre-coding processing, fast Fourier transform (FFT/IFFT), crest factor reduction (CFR), digital pre-distortion processing (DPD), digital up-conversion (DUC), digital down-conversion (DDC), configurable digital filtering, JESD204B/C, eCPRI & CPRI fronthaul interface protocol processing, 1588 and SyncE precise clock synchronization, etc.

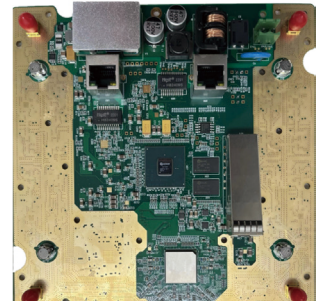
Ecosystem



2T2R RRU Reference Design



4T4R RRU Reference Design



4T4R Different band dual-mode
RRU Reference Design



Low power consumption

Ultichip DFE SoC consumes only 4W. Our power-optimized reference design further minimizes the equipment's power consumption.



Compact design

Highly functional integrated SoC design reduces the equipment's size.



Low cost

The equipment cost based on UC1046 is much lower than FPGA's.



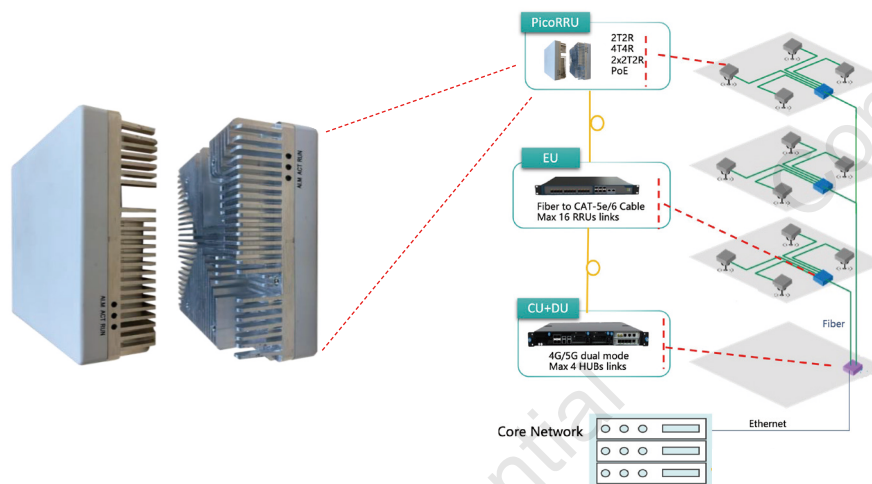
Flexibility

Programmable eCPRI & CPRI processor supports O-RAN fronthaul split option 7.x and 8. Additionally, it facilitates vendor-specific fronthaul protocols through the upgrade of software configurations and firmware.

RAN SOLUTIONS

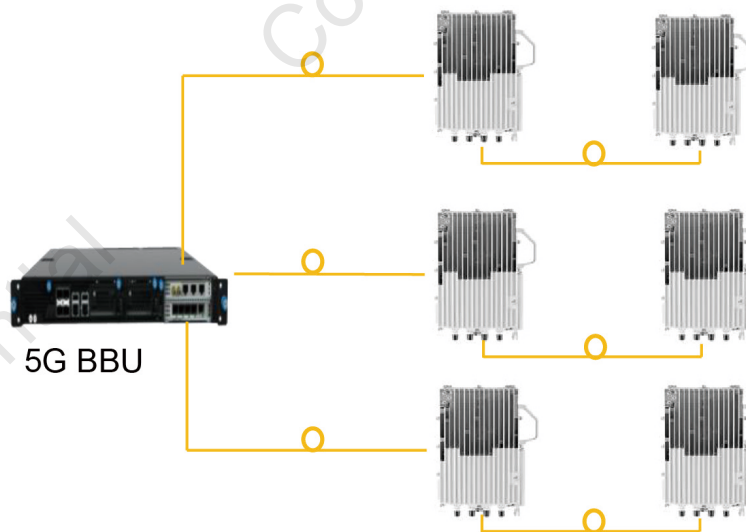
Meri - UC1046 Digital Front-End Device

Indoor RAN Solution



Ultichip's RAN solutions, including CU with DU, EU and Pico RRU, meets the requirements of indoor scenes.

Outdoor RAN Solution



Scenario

- Rural Area
- Wide Coverage Area
- Street

Features

- 5G/4G Dual Mode
- 2T2R x 40w, 4T4R x 40w
- Capacity: 400 users
- Broadband Backhaul

RRU SERIES

Meri - UC1046 Digital Front-End Device

Blade20 Pico RRU

Frequency Band	Sub 6G (N41, Customizable)
Antennas	2T2R NR
Max Tx Power	2 * 250mW
Carrier BW	200MHz, 100MHz, 80MHz, 60MHz, 40MHz, 20MHz
ACLR	$\leq -50\text{dBc}$ (24dBm, 100MHz NR, 8.5dB PAR signal)
Reference Sensitivity	$\leq -97\text{dBm}$ (QPSK)
EVM	$\leq 2\%$ (24dBm, 100MHz NR, 256QAM, 8.5dB PAR signal)

Blade22 Pico RRU

Frequency Band	Sub 6G (N41 + Band3, Customizable)
Antennas	2T2R NR + 2T2R LTE
Max Tx Power	4 * 250mW
Carrier BW	NR: 100MHz, 80MHz, 60MHz, 40MHz, 20MHz LTE: 20 MHz, 15 MHz, 10 MHz, 5 MHz, 3 MHz, 1.4 MHz
ACLR	$\leq -50\text{dBc}$ (24dBm, 100MHz NR, 8.5dB PAR signal)
Reference Sensitivity	NR: $\leq -97\text{dBm}$ (QPSK) LTE: $\leq -100\text{dBm}$ (QPSK)
EVM	$\leq 2\%$ (24dBm, 100MHz NR, 256QAM, 8.5dB PAR signal)

Blade40 Pico RRU

Frequency Band	Sub 6G (N78, Customizable)
Antennas	4T4R NR
Max Tx Power	4 * 250mW
Carrier BW	100MHz, 80MHz, 60MHz, 40MHz, 20MHz
ACLR	$\leq -50\text{dBc}$ (24dBm, 100MHz NR, 8.5dB PAR signal)
Reference Sensitivity	$\leq -97\text{dBm}$ (QPSK)
EVM	$\leq 2\%$ (24dBm, 100MHz NR, 256QAM, 8.5dB PAR signal)

Blade Series Design



Pico Cell – UC1046
Indoor Solution-Blade series RU

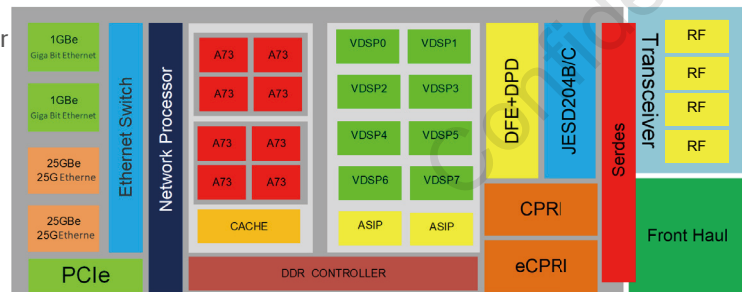


Micro Cell – UC1046
Outdoor Solution-Blade series RU

SILICONS

Small Cell SoC Platform—UC6000 Series

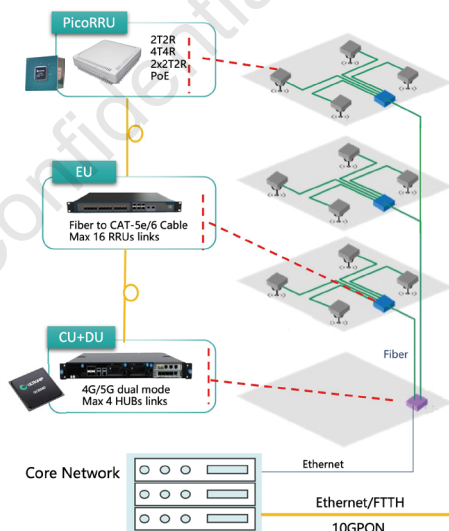
The UC6000 is Ultichip's advanced 5G/4G small cell SoC platform, including **UC6040 for femto cell**, **UC6060 for integrated cell**, and **UC6080 for distributed cell**. The SoC platform integrates DFE, DPD, Vector processors, and ASIP accelerator modules for baseband PHY, bit and soft bit processing ASIP for NR/LTE, ARM A73 for full protocol stack, and network processors for fronthaul as well as backhaul. It enables a range of applications, from micro and pico to femto cells, serving diverse needs such as hotspot coverage, in-building and wide area coverage. We offer reference designs based on UC6000 series.



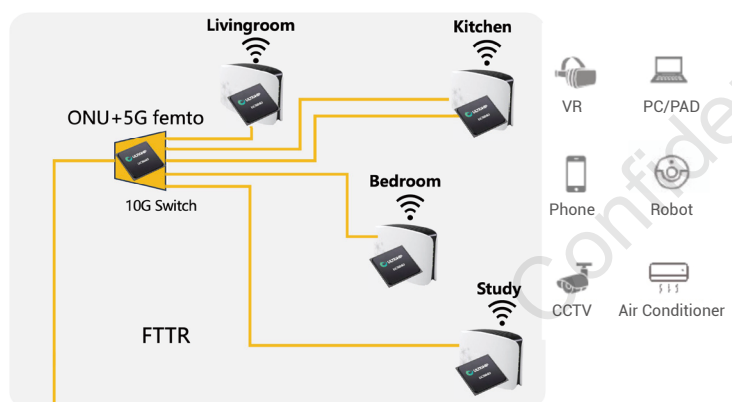
Features

- 8 ARM A73 processors up to 2.2GHz Frequency for full RAN protocol stack processing.
- 64bits DDR4 SDRAM, 3200MHz.
- Hardware encryption and decryption.
- 8 Vector DSP processors and ASIP including FFT, MMSE, LDPC, POLAR, and bit processors for physical layer processes
- 8-lane JESD204B/C interface connecting RF/ADC/ DAC transceivers. Lane rate up to 25Gbps.
- 6-channel DFE up to 6T6R Antennas.
- 25Gbps optical port with CPRI & eCPRI processor for fronthaul interface.
- Two 25Gbps and One 1Gbe ethernet ports for backhaul interface.
- PCIe4 can be used for integrating multi UC6000 chips and used as interface of BU PCIe cards.
- The network processor accelerate the packet parser and flow classification with DPDK API.

Building Network Topology



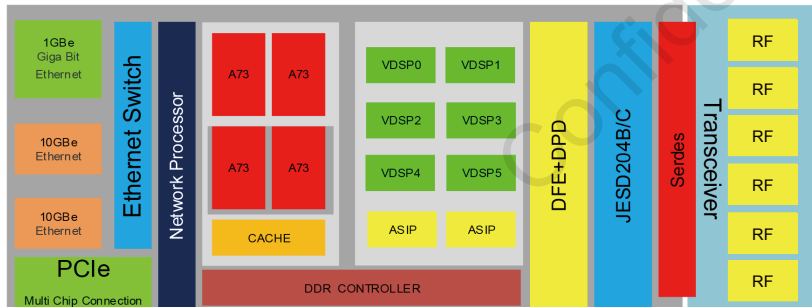
Home Network Topology



SILICONS

Femto Cell SoC- UC6040

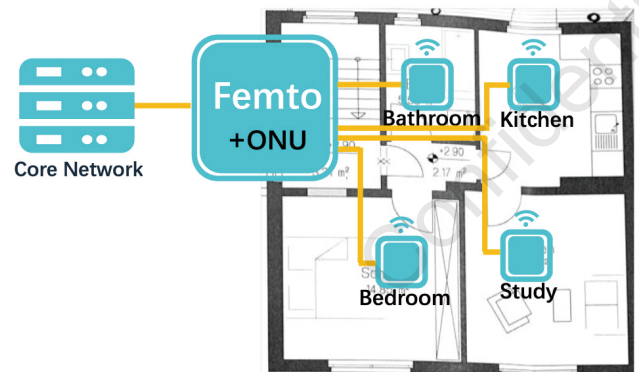
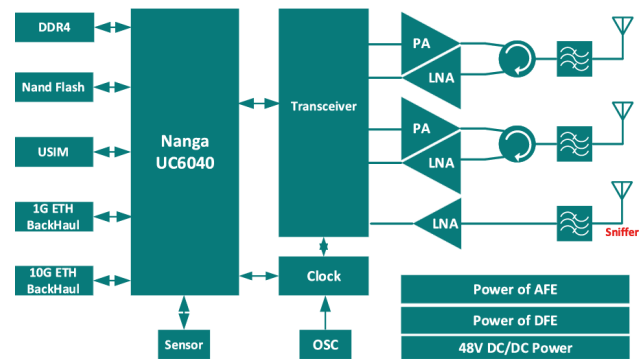
The UC6040 SoC is a cost-optimized version of the UC6000 platform for home cell applications. It encompasses all functionalities from antenna to baseband and protocol processing. Typical application scenarios are home base station to enhance 5G & 4G real-time communication and connection security. The SoC interfaces to the transceiver through the JESD204B/C interface. Additionally, the SoC includes an integrated PLL for transceivers, eliminating external PLL cost.



Features

	Description	
Standards	5G	4G
Cell	1C	1C
Antennas	2T2R	2T2R
Duplex Mode	TDD	TDD/ FDD
Max Throughput	850Mbps at 256QAM DL 190Mbps at 64QAM UL	150Mbps at 64QAM DL 50Mbps at 16QAM UL
Carrier Bandwidth	20MHz ~ 100MHz / 200MHz	1.4MHz ~ 20MHz
Subcarrier Spacing	30KHz / 60KHz / 120KHz	15KHz
Users/TTI	4	2
Active Users	32	8
Synchronization	Air Synchronization / IEEE 1588v2 / GPS / 1588ACR	
Encryption/Decryption	AES / SNOW3G / ZUS	
Backhaul Interface	10GBe	
Backhaul Encryption	IPSEC	
LMT	1GBe	
Fronthaul Interface	JESD 204B/C	
Power Consumption	< 10W	

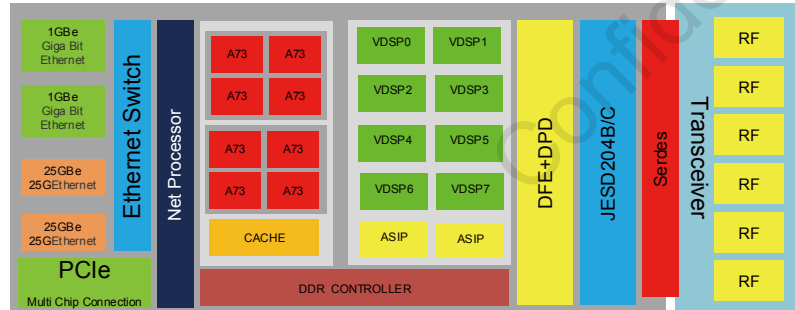
Femto Cell Diagram



SILICONS

Integrated Cell SoC- UC6060

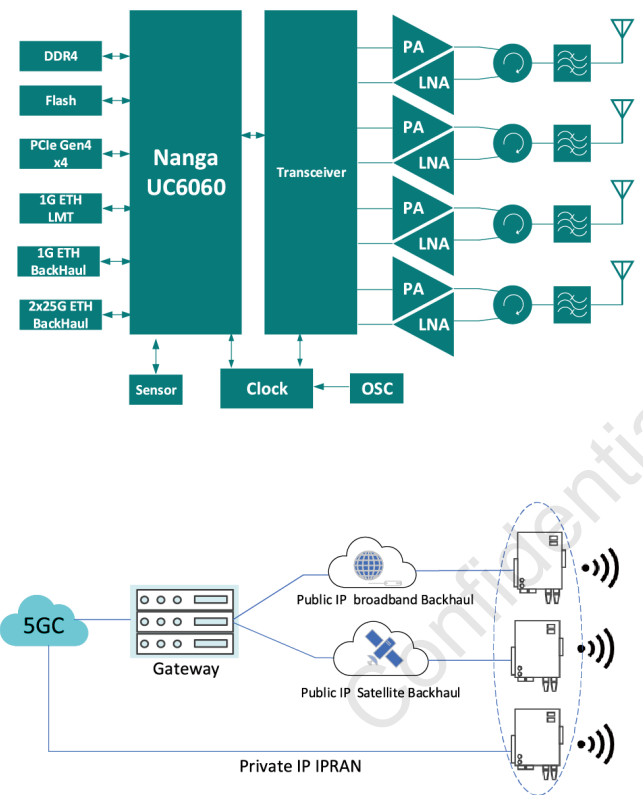
The UC6060 SoC is a high-performance version of the UC6000 platform, which optimized for integrated cells. It suits to base station of more active users and higher antenna output power. The integrated cell SoC UC6060 supports the 5G and 4G dual-mode. It encompasses all functionalities from antenna to baseband processing. UC6060 owns stronger protocol stack processing ability and up to 25Gbps backhaul interface attributed to 8 ARM cores. UC6060 is mainly used to supplement coverage blind spots, construct private network and enhance coverage hotspots, such as supermarkets, stadiums, ports, etc.



Features

	Description	
Standards	5G	4G
Cell	2C	2C
Antennas	1C 4T4R/ 2C 2T2R/ 1C 2T2R	1C 2T2R/ 2C 2T2R
Duplex Mode	TDD	TDD / FDD
Max Throughput	1700Mbps at 256QAM DL 330Mbps at 64QAM UL	150Mbps at 64QAM DL 50Mbps at 16QAM UL
Carrier Bandwidth	20MHz ~100MHz / 200MHz	1.4MHz~20MHz
Subcarrier Spacing	30KHz / 60KHz/ 120KHz	15KHz
Users/TTI	16	8
Active Users	400	200
Synchronization	IEEE 1588v2 / GPS	
Encryption/Decryption	AES / SNOW3G / ZUS	
Backhaul Interface	2 x 25GBe & 1 x 1GBe	
Backhaul Encryption	IPSEC	
LMT	1GBe	
Fronthaul Interface	JESD 204B/C	
Power Consumption	< 30w	

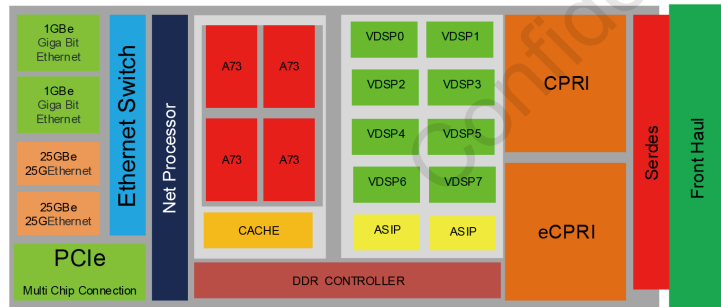
Femto Cell Diagram



SILICONS

Distributed Pico Cell SoC-UC6080

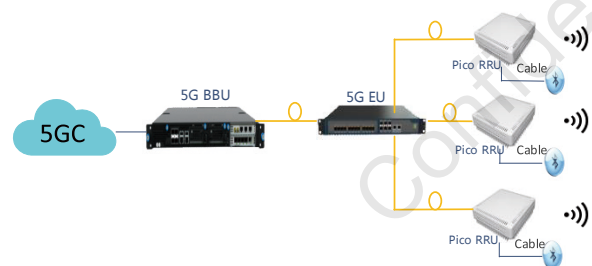
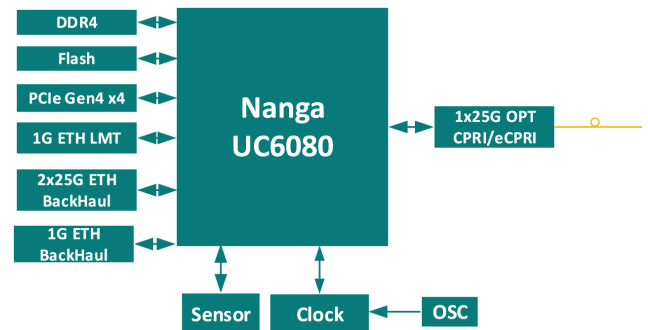
The UC6080 SoC is a scalable and pluggable version of the UC6000 platform for distributed Pico cells. It consists of all functionalities from antenna to baseband processing. The 25Gbps CPRI/eCPRI processor enables RRU from multi-vendors according to O-RAN fronthaul specifications and vendor specific requirements. Especially, the UC6080 can directly connect to UC1046 based RRU. Multiple UC6080s could be organized by the host processor through PCIe to increase sector number and capacity in a cell.



Features

	Description	
Standards	5G	4G
Cell	2C	2C
Antennas	1C 4T4R/ 2C 2T2R/ 1C 2T2R	1C 2T2R/ 2C 2T2R
Duplex Mode	TDD	TDD/ FDD
Max Throughput	1700Mbps at 256QAM DL 330Mbps at 64QAM UL	150Mbps at 64QAM DL 50Mbps at 16QAM UL
Carrier Bandwidth	20MHz ~100MHz / 200MHz	1.4MHz ~ 20MHz
Subcarrier Spacing	30KHz / 60KHz / 120KHz	15KHz
Users/TTI	16	8
Active Users	400	200
Synchronization	IEEE 1588v2 / GPS	
Encryption/Decryption	AES / SNOW3G / ZUS	
Backhaul Interface	2 x 25GBe & 1GBe	
Backhaul Encryption	IPSEC	
LMT	1GBe	
Fronthaul Interface	25Gbps, support CPRI / eCPRI / ORAN	
Power Consumption	< 30w	

Femto Cell Diagram





For more information, please visit www.ultichip.com.cn

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