UK-Taiwan Technology Showcase for Compound Semiconductors: RF Wireless Networks

Virtual event Wednesday 21st October 2020 9:00 – 11:00 UK time 16:00 – 18:00 Taiwan time





Industrial Technology **Research Institute**



The Field Programmable RF Company – Ultra flexible Radio solutions

Radio Solution for 5G network deployment UK-TW technology showcase for Compound Semiconductors

Lime Microsystems | FPRF company Guildford, Surrey, United Kingdom



Agenda

- 1. Introduction to Lime and market potential
- 2. Key objectives and technology offering
- 3. Products and ecosystem of suppliers
- 4. Summary



Lime at a Glance

Leading designer of Software-Defined Radio technology

Founded in 2005:











Democratising wireless communications, enabling innovation and industry disruption with FPRF Technology



Award winning Software Defined Radio solutions enabling **universal affordable wireless connectivity**,

LOCATIONS:

UK (HQ) with two European Design Centres

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New industry approach for deployment of wireless networks



Goal

Enable an ecosystem of partners and suppliers to democratise wireless innovation and create open wireless infrastructure using commodity hardware.

- Create Software Defined Wireless Networks using standard Linux computers and software defined radio technology. This will bring the computer industry to Radio Access Networks to:
- Reduce total cost of ownership for any kind of wireless networks, fixed and Mobile.
- Breaks single vendor dependencies through the separation of HW and SW provisioning
- Drives the **Open Source ecosystem** from the world of computing and innovation
- Accelerates operational readiness & commercialization by App enabling wireless networks



Cost Reduction



Software Defined Radio and GPPs



Open Source building blocks and technologies for programmable and virtualized networks



Lime Technology Overview

Lime brings the programmability of digital to RF and Wireless with its integrated FPRF solution

- Lime's Field programmable RF solutions replace multiple chipsets and can be configured as basic digital, analogue and RF functions all the way to a complete transceiver for wireless systems
- Highly integrated and capable of serving a wide range of applications, standards and frequency bands from Bluetooth to 5G
- Can be programmed over the air in real-time similarly to FPGA chipsets in digital domain
- Current chipsets and roadmap cover from 1MHz to 100GHz





Open CrowdCell , TIP initiative led by Vodafone

https://telecominfraproject.com/crowdcell/





Open CrowdCell – brings together a complete Open Source Solution

Lime microsystems



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- Operators driving virtualisation and Open RAN initiatives are accelerating adoption and rollout of networks with a diverse number of suppliers.
- Bringing the best practices from the world of computing to the wireless industry enables major growth fuelled by numerous Open Source initiatives
- Open Source initiatives backed Key silicon providers and manufacturers play an important role in enabling the Open Radio Access Networks.
- Flattening the telecom / wireless supply chain to reduce margin stacking and enable the design and deployment of low-cost equipment requires general availability of Microchip technology and Open Source software, enabling the contribution of App developers.



Blu Wireless Technology

Henry Nurser Chief Business Development Officer & Co-founder Oct 2020

Blu Wireless - Corporate Overview

- Established in 2011 to develop mmWave modem IP
- 100+ staff located in Bristol, India, North America & Japan
- Specialising in the licensing and sale of;
 - OEM products within a number of high value verticals using HYDRA based SoCs
 - HYDRA modem IP, SoC and design services for mmWave communications
- Renesas's RWM6050 (2x 5 Gbps dual HYDRA modem) in mass production
 - Roadmap of IPs and SoCs to >30Gbps performance
- Partnering for RF IC and Antennas from 39GHz to 95GHz
- Deployment of OEM products with the <u>Liverpool L5G</u> (FWA/Backhaul), Millbrook <u>AutoAir</u> (V2X) and <u>First Group</u> (Track-to-Train)
- World class silicon design team and design flow for internal IP and SoC development down to 7nm – as well as 3rd party projects





Wireless

Semiconductor





Multi-gigabit demands for mmWave





Smart City

High Speed Transport





Industry 4.0

Simple to install "last mile" links, meshed Small Cell Backhaul, FWA, etc.

Trackside to Train (T2T) and General vehicle (V2I, V2V & V2X)* connectivity

1Gbps @ 1km

In production

>2Gbps @ 360kph

* Vehicle to Infrastructure, Vehicle to Vehicle and Vehicle to Everything

High bandwidth and low latency connectivity for security, control and video

>3Gbps @ 200m

Unlicensed mmWave for 5G infrastructure



- Unlicensed mmWave links now seen as <u>complementary</u> to fibre and 3GPP access
- Three main drivers in market
 - Meshed 'last 100m' links for broadband, security, etc.
 - 4G/5G Small Cell backhaul for both MNO and 'private LTE'
 - In-building links Enterprise/Factory 4.0
- True "Edge Compute" increasingly critical
- The *low cost, low power and low regulatory barriers to entry* of unlicensed solutions now driving volume deployment
- Customers demand high quality, but 'good value' solutions





A silicon roadmap from 5Gbps to >30Gbps

- Existing products designed in TSMC 28HPC for 2020/21 MP
- Multiple RF partners for 'now' and 'future' deployments
 - All 6 channels of 'V-band' 57-71 GHz
 - 39GHz (>30Km range) and 95GHz
 - 4GHz bandwidth support
- Next generation of SoCs (≤22nm) for mass production in 2023
 - Modular & scalable modem IP
 - SoC defined by application need
 - Parallel offering on FPGA for low volume deployments

Automotive test track and rail proven



* Dual link

** End-to-end round trip delay to gateway





Cell Sites & mast-side cabinel V2X Fibre and Power Links

/2X mmWave masts



Company Capabilities – 'soup to nuts'







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Silicon Systems Capabilities





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Silicon customer references

Blu Wireless is guite unique – not only are they very knowledgeable and capable in terms of designing semiconductor devices or chips but they also have profound knowledge in the software capability and support – a complete team.

Ron Jew, Renesas (IDT)

Arm understands the importance of being able to anticipate market needs and then deliver the technology required to address them. Blu Wireless has done this for mmWave links for 5G infrastructure applications, and we look forward to seeing them build on the world class team, expertise and IP they have created in this space.

arm

Blu Wireless had a major impact on our business in terms of acceleration. We got up and running very quickly with a very experienced team that saved us a lot of time and reduced risk.

Peter Claydon, President, Picocom







Noel Hurley, VP & GM Strategy, ARM



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The CSA Catapult is a member of CS-Connected – the South Wales compound semiconductor cluster

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