



A Message from MoSys CEO

Welcome to another edition of the MoSys newsletter. In this special edition, we focus on one of the hottest trends in high tech, 5G.

MoSys is using its Graph Memory Engines (GME) in its new Stellar Packet Classification product line to accelerate the processing of all of the data that passes between the base station and the 5G Core and onto the Cloud. New advances in FPGA technology from Achronix, Intel and Xilinx are enabling innovative ways to accelerate the demanding, low latency packet lookup and steering functions that is done by the 5G UPF (User Plane Function) that new 5G applications demand.

5G is poised to change everything and we want to provide you an update on the latest in MoSys products designed to accelerate 5G.

New 5G mmWave spectrum will be able to achieve multi-gigabit access rates and traffic is expected to triple by 2025 and triple again by 2030.

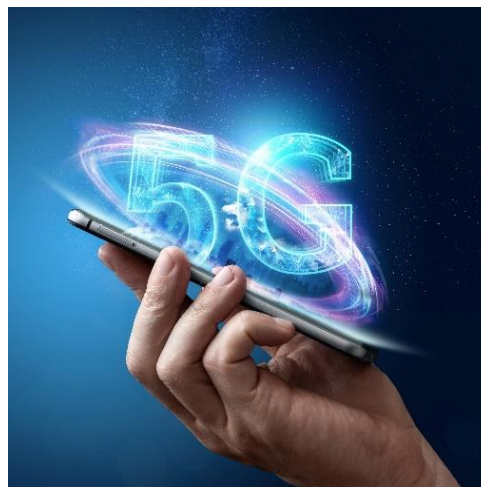
New 5G applications will require very low latencies, procedures such as remote surgery will be better enabled by 5G, autonomous vehicle infrastructure, V2X - vehicle to everything, stadium hotspots, AR/VR, smart cities, smart factories, smart traffic lights, 'smart everything' and more will be made much easier by 5G.

Finally, 5G will enable an incredibly high number of devices to be connected to the network.

According to estimates, 70 billion IoT devices will be connected by 2030 and the density could be as high as 1 million devices per square kilometer.

Working with MoSys, you can claim a bigger share of those investments.

Dan Lewis
CEO, MoSys, Inc.



Latest Product News Alerts!

Blazar & Quazar

[MoSys Silicon Chosen by APS Networks to Help Telcos Boost Number of Subscribers for Broadband Network Gateways](#)

[MoSys and Arrow Electronics Collaborate to Optimize System Memory on FPGA Designs](#)

Stellar

[MoSys Announces Optimized P4 Pipeline Support for Stellar Packet Classification Platform IP for FPGAs](#)

[MoSys Expands Patent Portfolio with Purchase of Custom Algorithm Search Patents](#)

LineSpeed

[MoSys Announces New, Low Price Point for Its LineSpeed™ Flex 100G PHY IC Product Family](#)

[Multiplexing and Demultiplexing High-Speed Serial Links with MoSys LineSpeed™ Flex PHY](#)



5G: Everything is Going to Change

30 Million New 5G Base Stations

5G will require many more base stations than we have right now.

Dell'Oro estimates that 30 million new 5G base-stations will be deployed over the next five years and with all the infrastructure that needs to go with it, this will make 5G one of the industry's biggest investments.

5G – All About the UPF

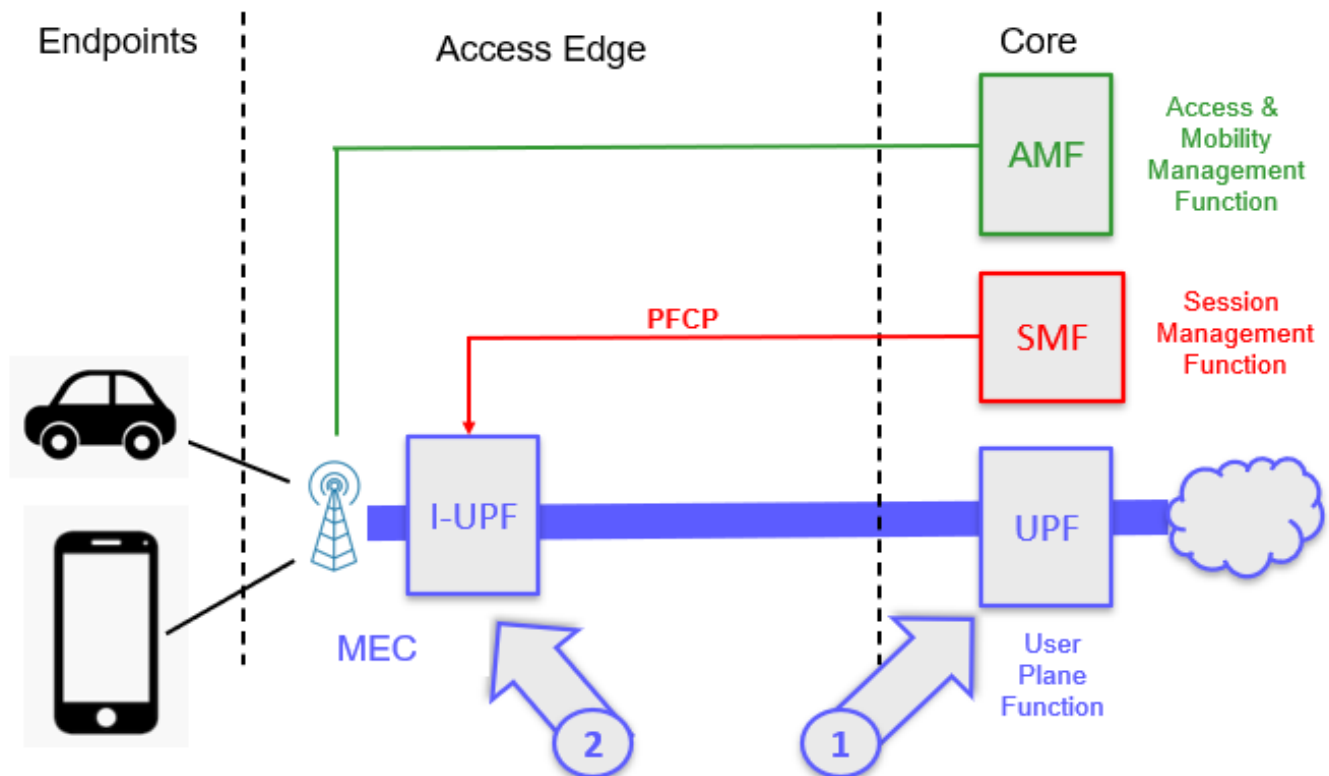
One of the most important new elements in the 5G network is the UPF which stands for User Plane Function, and all of the traffic from any wireless device must pass through the UPF.

See the diagram below, the thick blue line across the bottom of the picture – this is the path that ALL the main traffic takes.

New 5G base stations can handle 20 – 60Gbps of traffic each, and they all feed into the UPF.

So, as you can imagine, the UPF can become a real bottleneck.

Think of the UPF as the 5G traffic cop.



Two main locations for UPF – Core and MEC (Edge)

Simplified diagram (not all connections shown)



5G: Everything is Going to Change

5G – The Good News about Bottlenecks

The good news is that MoSys can help your products handle these 5G bottlenecks – our MoSys Stellar Packet Classification Acceleration IP and Blazar and Quazar ICs are tuned for 5G.

You can differentiate your offerings by using MoSys technology.

You will see that UPF appears in two places – at the Edge and in the Core and both can become bottlenecks.

So, you have two places you can sell your newly accelerated products!

5G – Three Problems to Solve

At each UPF, you have three main problems to solve:

- 1) Huge bandwidth that needs handling
- 2) Low latencies required
- 3) Huge number of devices to manage

Each packet must be classified to decide what to do with it. However, compared with 4G, the traffic volume can be 100X and the time you have to do the classification continues to shrink because of the low latency demands from new applications.

The biggest issue is that software alone cannot keep up with all these requirements. What is needed is an Accelerated Infrastructure, something better than just software.

Advances in FPGAs from Achronix, Intel and Xilinx allow software solutions to be replaced and accelerated to help handle these three problems.

But FPGAs still need programming, and they can have other limitations as they can run out of precious internal memory.

This is where MoSys can help you – our new family of Stellar Packet Classification IP is optimized to accelerate the 5G UPF processing and run on these new breeds of FPGA.

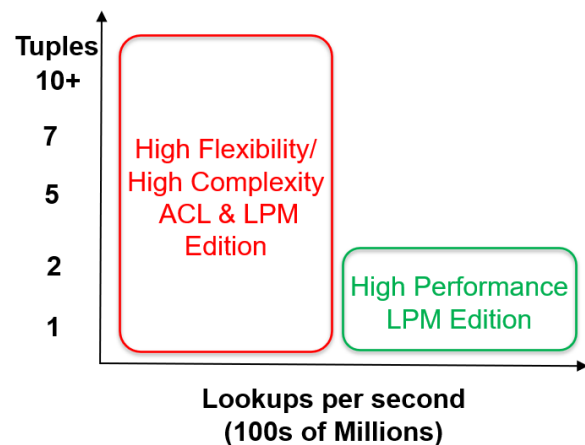
MoSys also offers a way to supplement the sometimes scarce FPGA resources. By adding one of our Quazar or Blazar Accelerator Engines you can expand the performance of your FPGA.

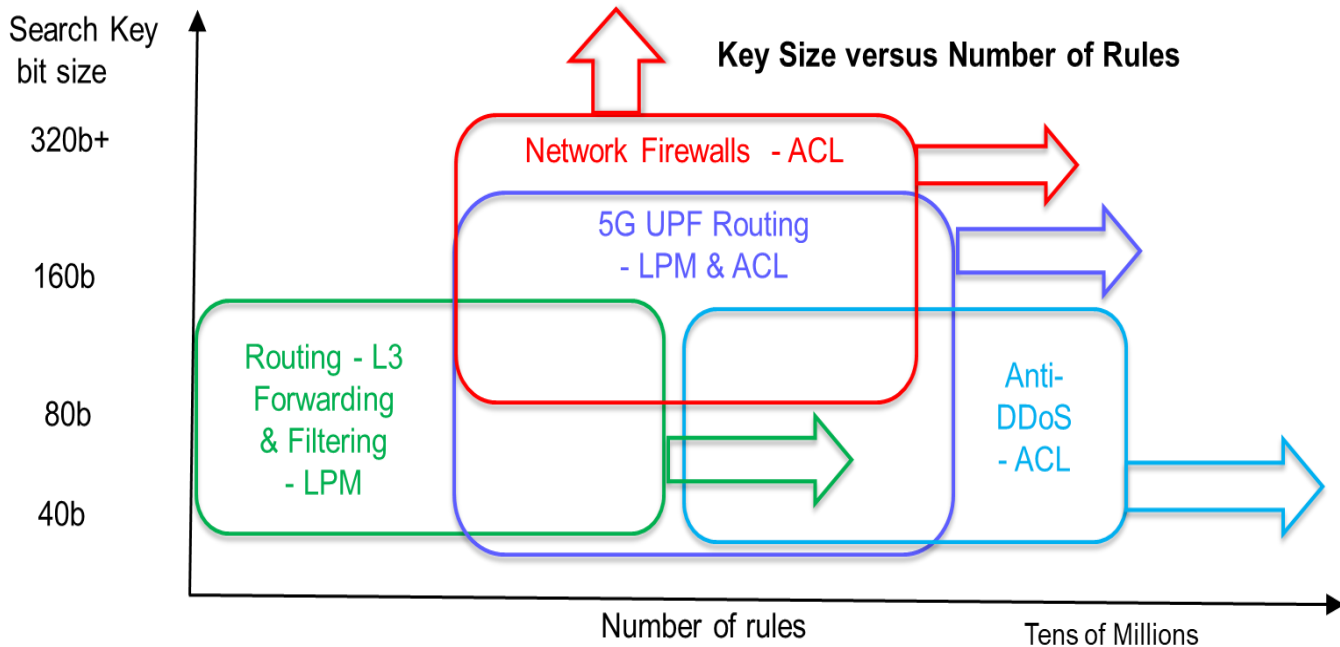
MoSys Stellar Packet Classification IP

The MoSys STELLAR Packet Classification Platform is provided as IP for a variety of accelerators and supports ultra-high search performance using lookup rules based on highly complex Access Control List (ACL) and Longest Prefix Match (LPM).

Hundreds of Millions of Lookups per Second

Stellar supports header lookups at 100s of millions of lookups per second with millions of rules and can easily support networks from 100Gbps to Terabits/s.





Market Requirements for Various Use Cases

The diagram above shows the differences in search key size and number of rules required for four different use cases for the MoSys Stellar Packet Classification IP – 5G UPF lies at about the mid-point for rule size and number of rules, making it an ideal use for the MoSys IP.

❖ Routing - L3 Forwarding & Filtering - LPM

- Virtual Routing Table ID + IPv4/6 → 8b port + 48b MAC address
- Rule Table Size: 10K to ~4M+ rules
- Key Size: 40b or 160b+, fast insert

❖ 5G UPF Routing – User Plane Function – ACL & LPM

- Core and Edge conversion of RAN traffic to IP traffic
- Rule Table Size: 100K to 5M+ rules
- Key Size: ~200b+

❖ Security – Network Firewalls - ACL

- All bit match, some bits match and range match
- Rule Table Size: 100K to ~1M to as high 8M+ rules
- Key Size: 5 to 10 Tuple from ~120b to ~320b+

❖ Security – Anti-DDoS - ACL

- Allow and Deny List Filtering using Access Control lists
- Rule Table Size: 1M to 40M+ rules, fast insert
- Key Size: 40b to 160b+



MoSys Stellar Packet Classification IP - High Flexibility / High Complexity ACL & LPM Specifications

Ultra-High-Speed Search Engine IP - Ideal for a Very Wide Range of Use Cases

- Tuned for complex n-tuple lookups using Access Control List (ACL)
- Also supports Longest Prefix Match (LPM)
- Powerful Deep Header Inspection (DHI) solution
- Uses MoSys Graph Memory Engine (GME)



Performance

- Hundreds of Millions of lookups per second
- Millions of Rules
- Optimized for complex 1 - 10+ tuple matches
- Typical key size 40 -480b keys
- Very fast rule updates - No need to recompile
- On the fly live updates – no need to stop traffic

TCAM Equivalence

- Can replace multiple expensive and power hungry TCAM chips
- Up to multigigabit TCAM equivalence

New MoSys Accelerated Products Already in Development

Several OEMs and ODMs are already creating Accelerated UPFs using MoSys Stellar Packet Classification IP embedded in high-performance FPGAs or using our Blazar FPGA Accelerator Engine ICs.

Come join them.

For more details on our Stellar Packet Classification FPGA IP, check out our product brief here: [LINK](#)

5G Use Cases: [LINK](#)

5G Blog: [LINK](#)

For details on our Quazar and Blazar Accelerator Engines: [LINK](#)