Network Infrastructure at 10K+ Snapshotted VM Scale

- **Speaker**: Shivendra Srivastava, Prashant Kumar Singh, Kshitij Gupta
- **Room**: 332
- **Time**: Friday, Oct 23rd 17:00 – 17:50

- **Format**: Talk (50 min)
- **Difficulty**: Advanced
- **Track**: Technical
- **Additional Tags**: Linux Networking, Virtualization, eBPF, Serverless, AWS Lambda, Scalability, Geneve Tunneling
- **Experience**: Senior Engineering Leaders and Principal Engineers at AWS Lambda specializing in serverless compute, distributed systems, and networking infrastructure.

Description:

Running thousands of snapshotted VMs pushes Linux networking primitives to their limits. This talk covers battle-tested strategies for designing large-scale network topologies that balance performance, isolation, and resource efficiency.

The session will dive into practical solutions for high-density VM environments, including the use of Geneve tunneling for scalable overlay networks, eBPF-accelerated networking to bypass kernel bottlenecks and achieve line-rate performance, and stateless NAT techniques that enable network reuse without connection tracking overhead. The speakers will also discuss smart firewall design using device prefix-based iptables/nftables rules and namespace pooling strategies to minimize operation costs during rapid VM snapshotting. Finally, the talk addresses RTNL lock contention and its operational impact on large-scale deployments. Attendees will learn how to architect network stacks where VMs are frequently cloned, restored, and migrated while maintaining security boundaries and predictable performance.

Target Audience:

- Cloud infrastructure and systems engineers
- Linux networking and kernel specialists
- Architects designing high-density virtualization or serverless platforms

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