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Scalable Network Slicing Architecture for 5G Tulja Vamshi Kiran Buyakar, Amogh PC, Bheemarjuna Reddy Tamma, and Antony Franklin A Department of Computer Science and Engineering, IIT Hyderabad, India

NETWORK SLICING

- Allows the mobile network operator to split a single shared physical network into multiple logical or virtual networks.
- Diversified use cases of next-generation mobile networks can be realized by the key concept of Network Slicing.



SCALABLE NETWORK SLICING ARCHITECTURE

- Scalable Network Slicing Architecture (SNSA), the ETSI MANO framework is extended with some additional components like Network Slicing Profiler (NSP), Network Slice Scaling Function (NSSF).
- NSP maintains profiles of various network slices with respect to set of available physical and virtual network resources.
- NSSF runs the slice specific scaling algorithm.

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IMPLEMENTATION FRAMEWORK





RESULTS

• Poisson distribution is used for modeling the UE arrival rate.





EXPERIMENTAL PARAMETERS

- Experiments are conduted on Intel Xeon CPU E5- 2690 server, with 64GB RAM, running Ubuntu 16.04.2 LTS OS.
- Separate VMs are used for individual network functions.

Parameter	Value	
Number of UEs	0 to 300	
Simulation Time	360 Seconds	
Network Slices	[eMBB1, eMBB2, mMTC]	
SliceIDs	[s1, s2, s3]	
Packet Size [s1, s2, s3] in Bytes	[800, 800, 100]	
Min. Bandwidth per flow for [s1, s2, s3] in Mbps	[5, 10, -]	
<i>NUEs</i> for [s1, s2, s3]	[10,10,-]	
<i>BW</i> _{init} for [s1, s2, s3] in Mbps	[60, 120, 80]	
BW_{max} for [s1, s2, s3] in Mbps	[1920, 960, 80]	
UE Data Transfer Duration for [s1, s2, s3]	[60-180s, 30-80s, 5s]	
Mean Arrival Rate (λ 1) for eMBB1 [0:250s]	12	
Mean Arrival Rate (λ 2) for eMBB2 [0:150s]	12	
Mean Arrival Rate (λ 3) for mMTC	4 in [0:50s]	
	15 in [100:150s]	
	8 in [150:200s]	

(a) UE Load Distri- (b) Bandwidth Provi- (c) Avg. CPU Load bution. sioned for Slice. over all the Instances.

150

Time (Secs)





CONCLUSIONS

- Proposed a novel NSP and NSSF modules on the open source technologies to realize the network slicing.
- Demonstrated that SLAs of the eMBB slices is ensured when all three slices are running
- Evaluated Bandwidth isolation among slices and scaling of the slices by considering eMBB and mMTC slices.
- Extend NSP and NSSF with the latency requirements of net-

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work slices considered.

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