

# draft-hsingh-coinrg-reqs- p4comp-03

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COIN RG

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# Background

- Research growing to split P4 program to run on heterogeneous nodes
- E.g., distributed computing (UPenn's Flightplan) splits P4 program to run on network switch, FPGA in NIC, and server machine
  - split uses cost of compute, latency, data rate, etc.
- DARPA (U.S.) has \$30 million fund to shake out 5G cellular network - Aether and Pronto projects also split P4 program to run on heterogeneous nodes (<https://prontoproject.org/#vision>)



# More Background

- Other research in disaggregation, especially, 5G cellular CUPS moving certain control-plane functions to data plane for performance
- See TurboEPC,  
<https://www.cse.iitb.ac.in/~mythili/research/papers/2020-turboepc.pdf>
  - moves stateless/local state functions to run in switch data plane
  - uses P4 in data plane (Netronome NIC)

# Need Requirements doc

- Avoid



- Flightplan did not consider requirements listed in our draft
- Doc also guides DARPA's Pronto and Aether projects
- Doc guides future disaggregation of network nodes
- IRTF/IETF is appropriate body for requirements doc



# Requirements Deep Dive

- If features runs on switch, do not split following functions to run elsewhere
  - ARP and IPv6 ND
  - ARP and IPv6 ND Proxy
  - BGP table
- Switch has TCAM but FPGA on NIC does not
  - how does ternary P4 table using TCAM move to NIC?
  - algorithms for ternary match using hashes are required on FPGA
  - user input is desirable for what hash to use
- Automated tool splitting program should provide manual override
  - e.g., code doesn't fit in switch data plane initially, but manual editing of code may be able to fit



# Other Details

- A switch has 32, 100G ports, each port supports 4 25G hosts
  - how does code split to NIC with 2 100G ports for only 8 hosts?
  - more NIC needed but hosts in single link-local domain on switch are now in other link-local domains using different NICs
- How is punt path affected? Also define what is punt path for data plane running in Linux user space
- draft proposes new P4 table property `atomic` to block splitting table and associated P4 actions and control body

- Questions/Comments?