Observations on BGP & OSPF CPU Utilisation

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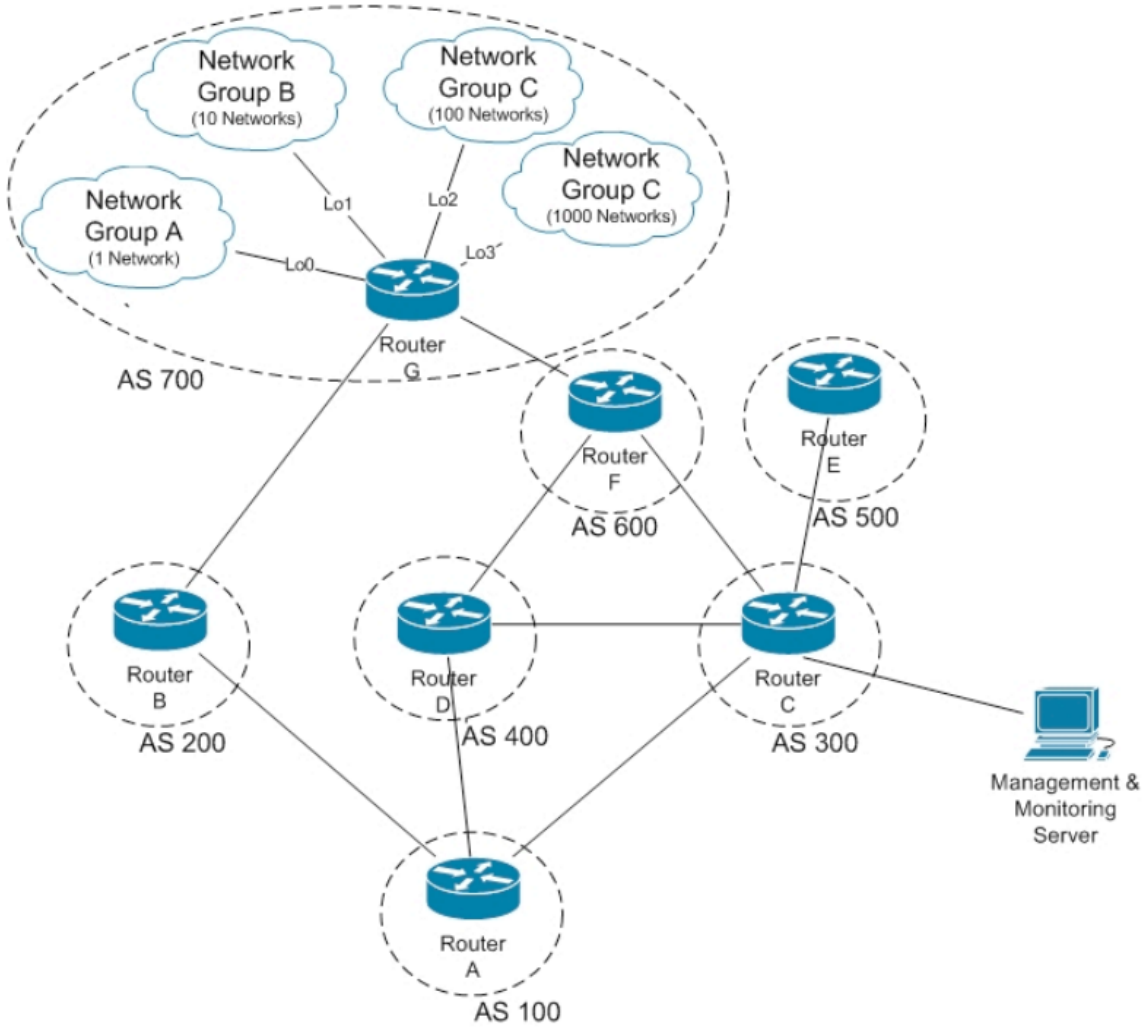
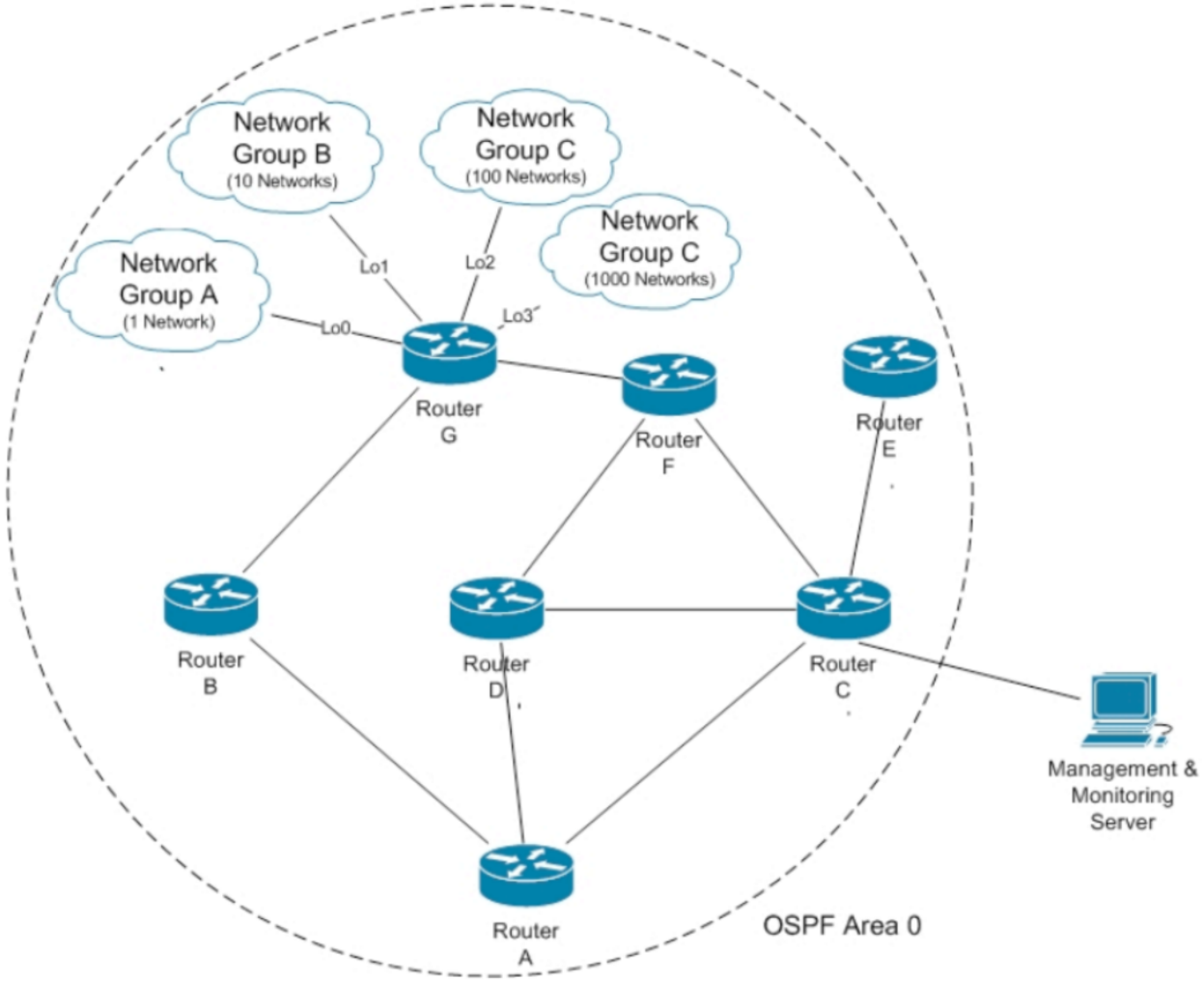
It's been said that…

"The Dijkstra algorithm is more CPU intensive than distance or path based vector algorithms"

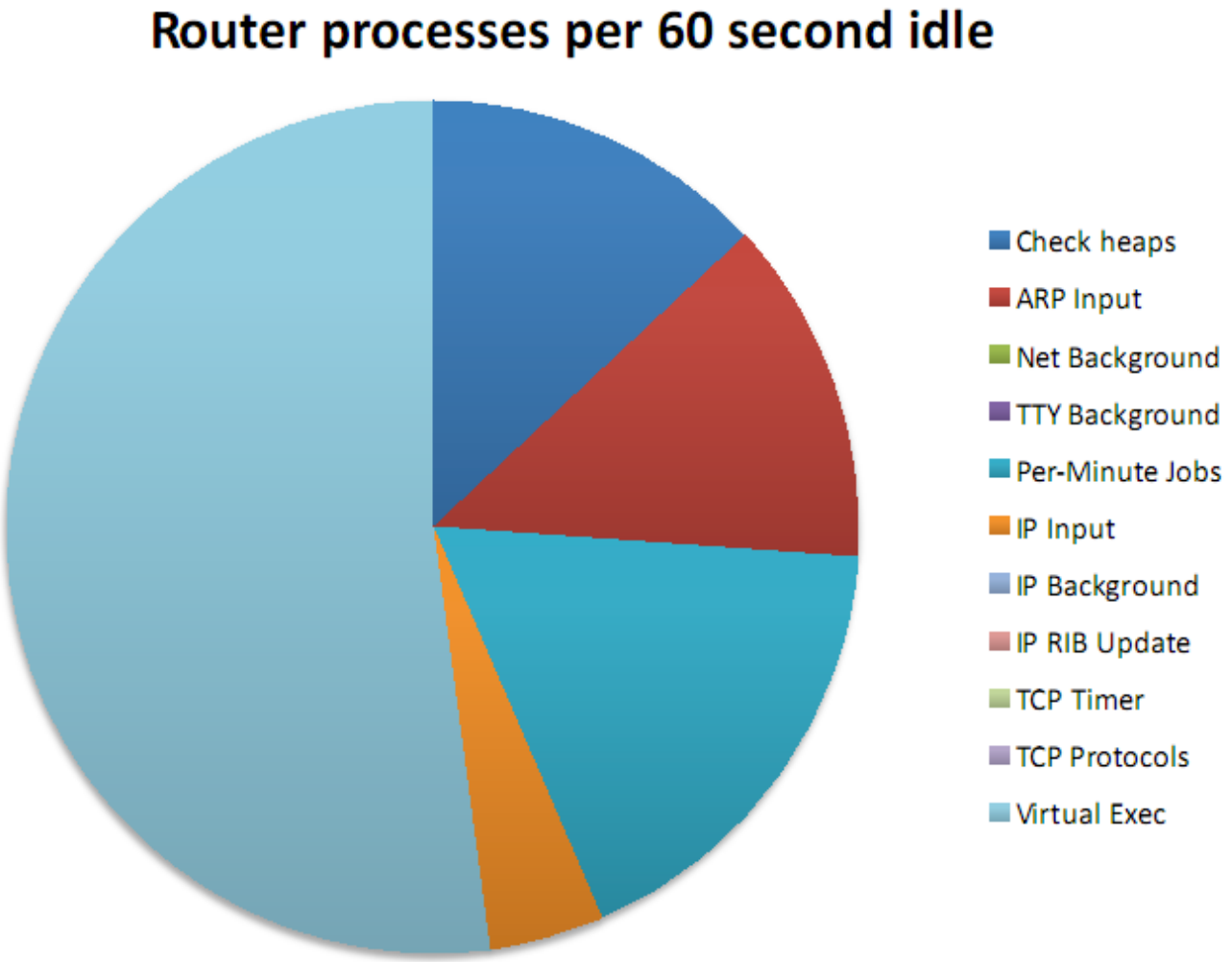
BGP Network Design



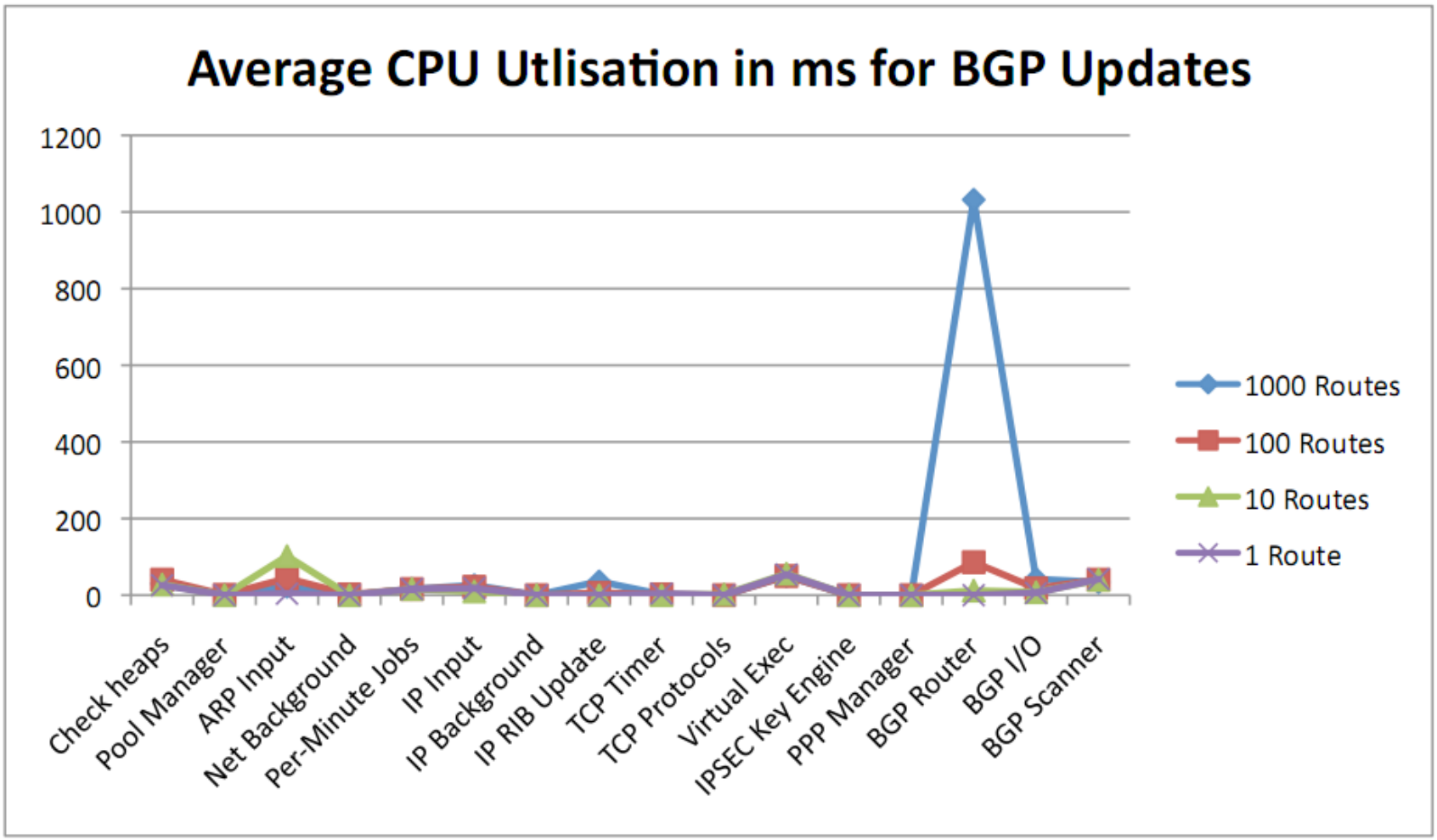
OSPF Network Design

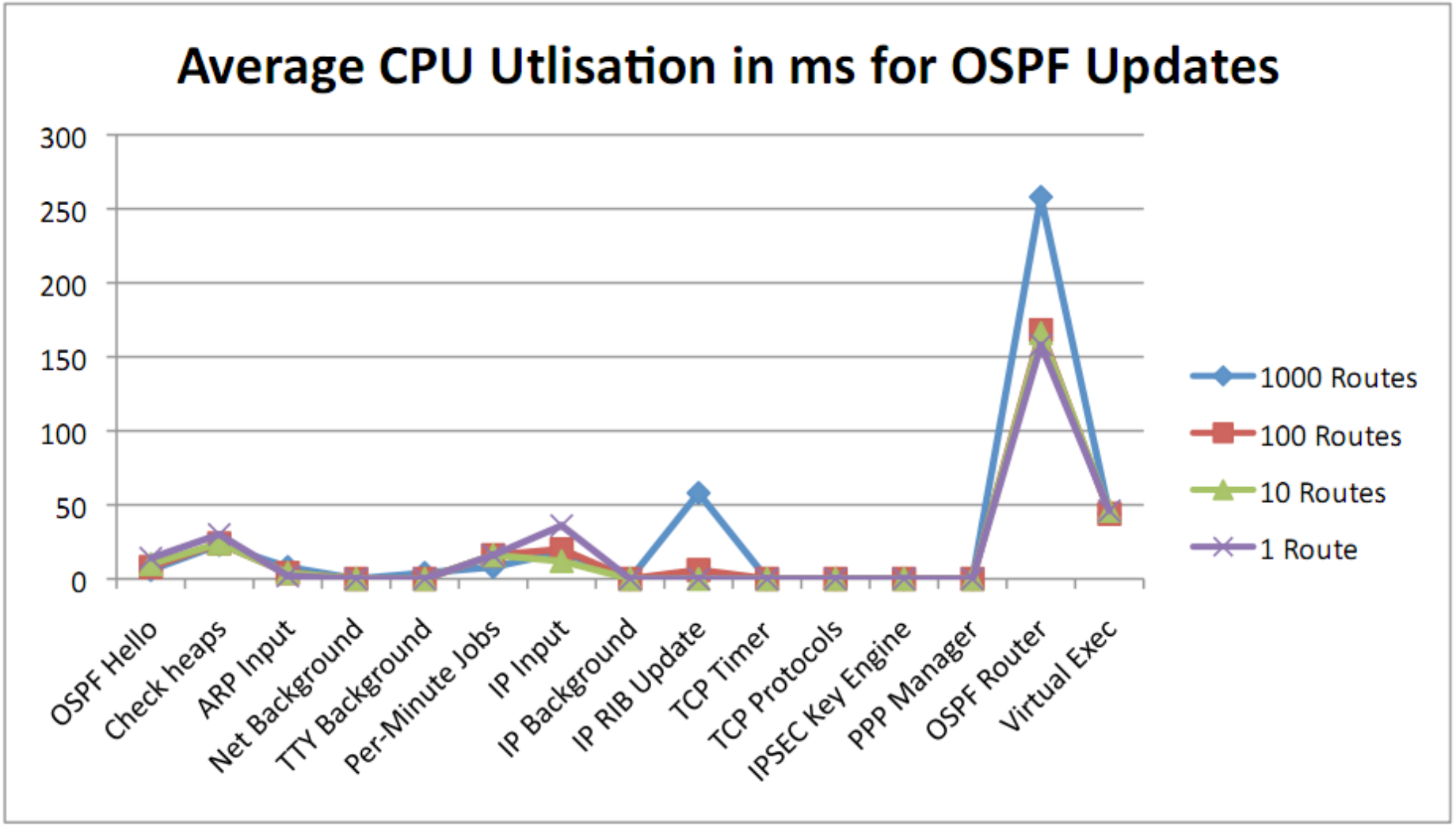


Baseline

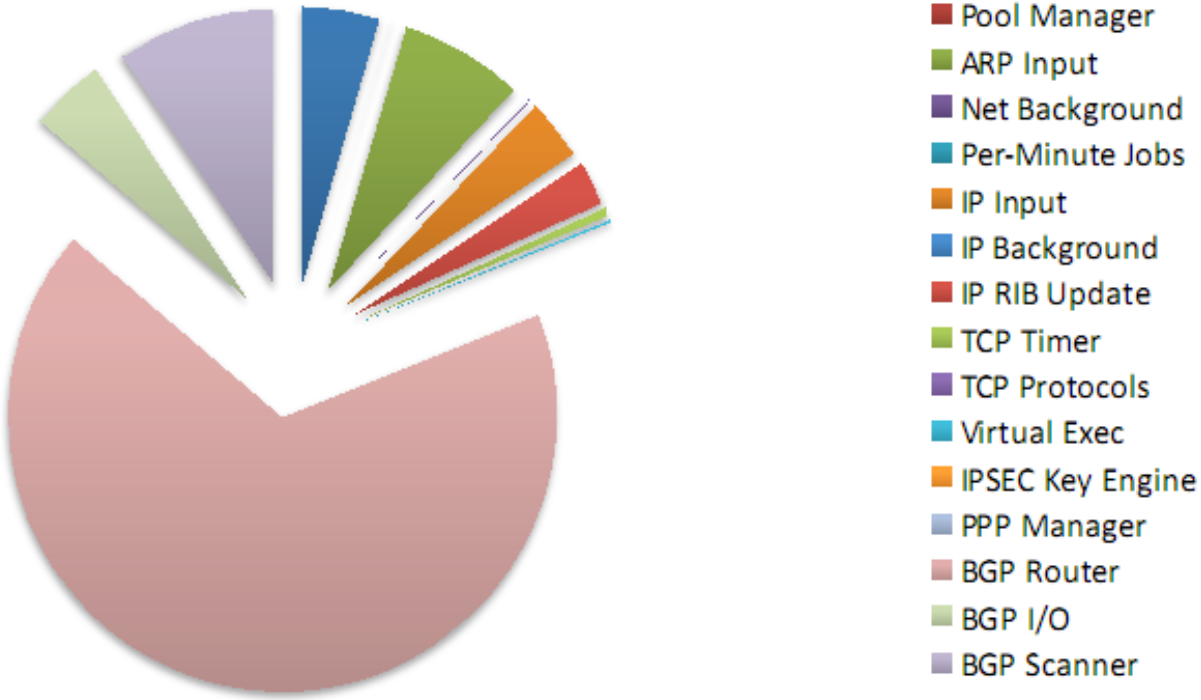

Router processes per 60 second idle
Check heaps
ARP Input
Net Background
TTY Background
Per-Minute Jobs
IP Input
IP Background
IP RIB Update
TCP Timer
TCP Protocols
Virtual Exec

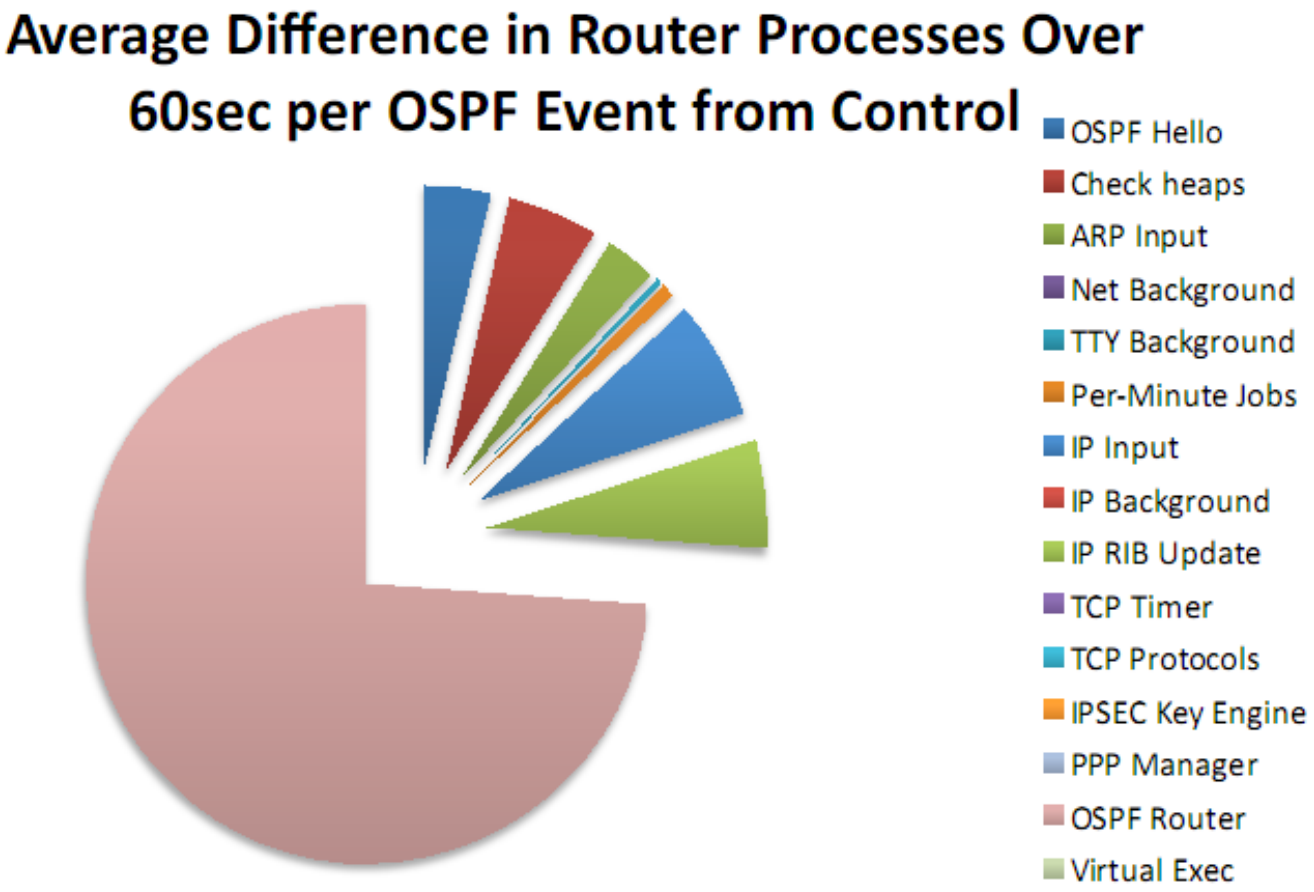
Results of Experiment 2 & 3


Average CPU Utlisation in ms for BGP Updates
1200
1000
800
600
400
200
0
Check heaps
Pool Manager
ARP Input
Net Background
Per-Minute Jobs
IP Input
IP Background
IP RIB Update
TCP Timer
TCP Protocols
Virtual Exec
IPSEC Key Engine
PPP Manager
BGP Router
BGP I/O
BGP Scanner
1000 Routes
100 Routes
10 Routes
1 Route


Average CPU Utlisation in ms for OSPF Updates
300
250
200
150
100
50
0
OSPF Hello
Check heaps
ARP Input
Net Background
TTY Background
Per-Minute Jobs
IP Input
IP Background
IP RIB Update
TCP Timer
TCP Protocols
IPSEC Key Engine
PPP Manager
OSPF Router
Virtual Exec
1000 Routes
100 Routes
10 Routes
1 Route

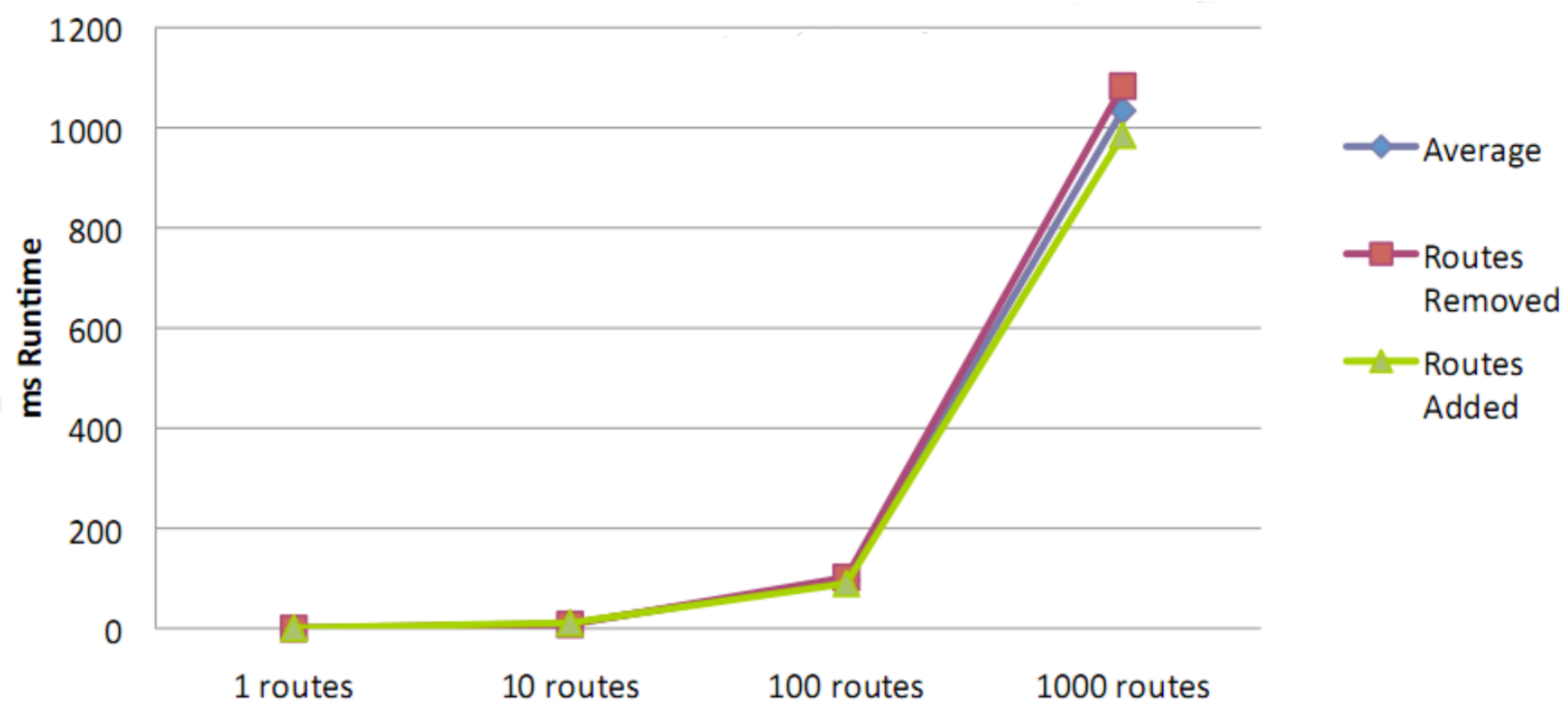
Average Difference in Router Processes Over 60sec per BGP Event from Control



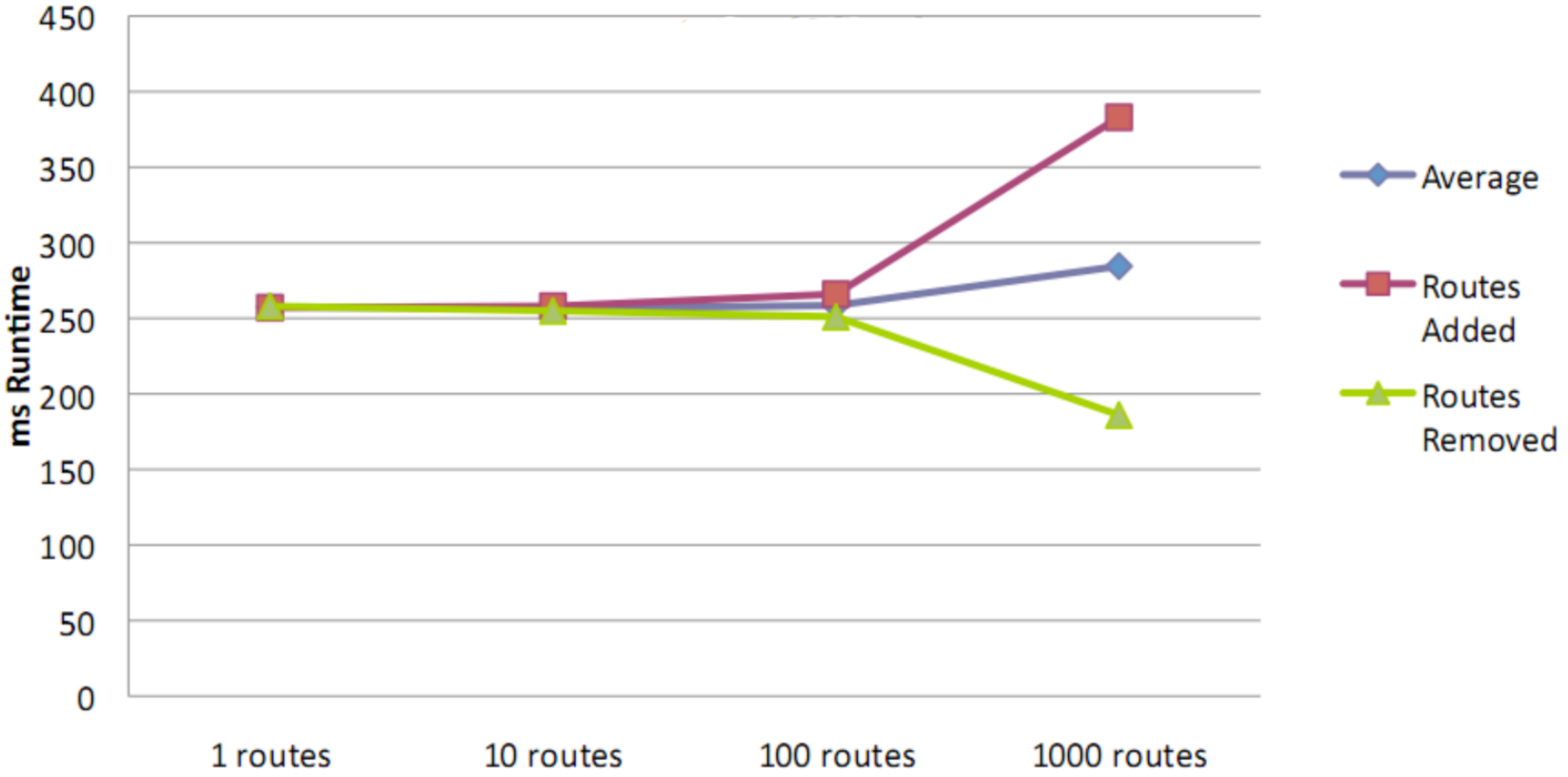

Average Difference in Router Processes Over 60sec per OSPF Event from Control
OSPF Hello
Check heaps
ARP Input
Net Background
TTY Background
Per-Minute Jobs
IP Input
IP Background
IP RIB Update
TCP Timer
TCP Protocols
IPSEC Key Engine
PPP Manager
OSPF Router
Virtual Exec

http://en.wikipedia.org/wiki/File:Standing-rib-roast-MCB.jpg

ms Runtime of BGP Routing Process



ms Runtime of OSPF Routing Process



BGP & OSPF Comparison of Runtime

Conclusion

- Insight into the implementation of these protocols in Cisco IOS
- OSPF: single SPF calculation per destination
- BGP: best path selection calculation per route

- Thereby at about 320 routes OSPF is more efficient in terms of CPU utilisation than BGP

Some Shortcomings

- Clearly lots more research can be done
- Ms measurement of CPU utilisation
- Vendor independent approach
- ....