# Serengeti Broadband Network

Towards single Watt and nJoule/bit routing

# Outline

- Background
- Challenges
- Approaches
- Conclusion

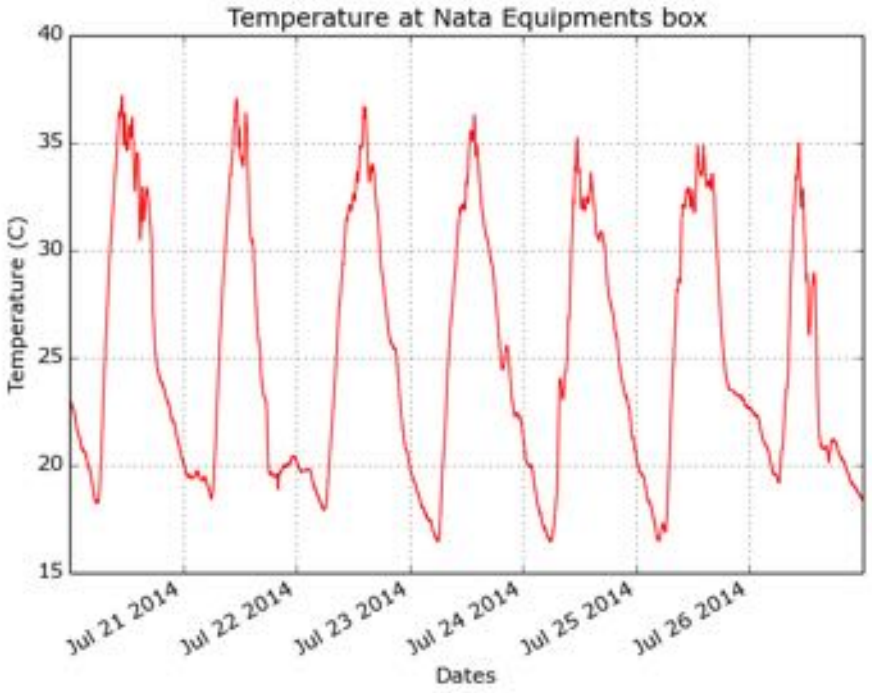

## Serengeti Broadband Network Topology

A LAN spanning two districts in Mara region, northwest Tanzania

The greater the obstacle, the more glory in overcoming it. -Molière

# CHALLENGES

# High Operational Temperature

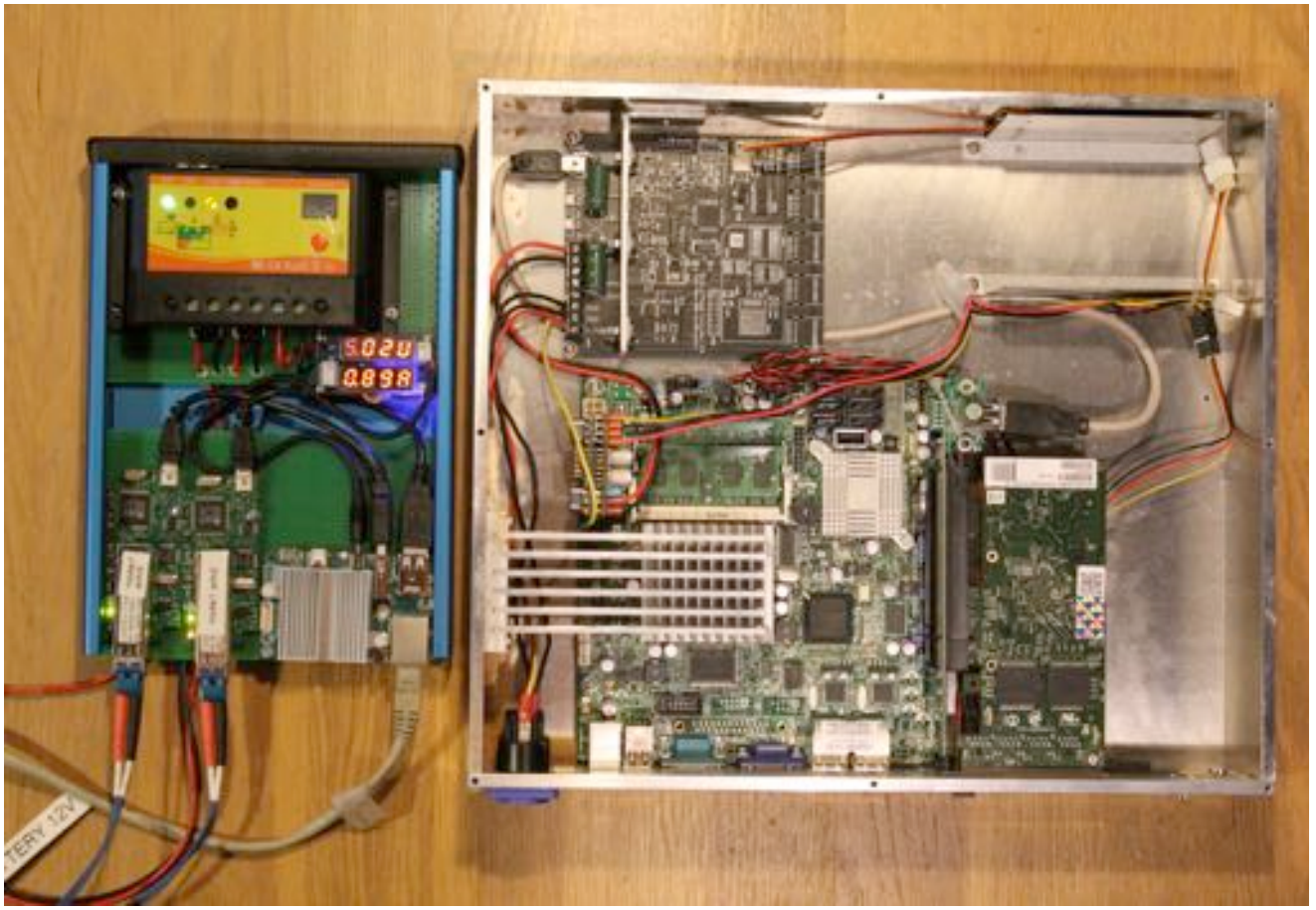



Frequent Power outage and harmful transient

# Avoid Deep Discharge by minimizing power consumption

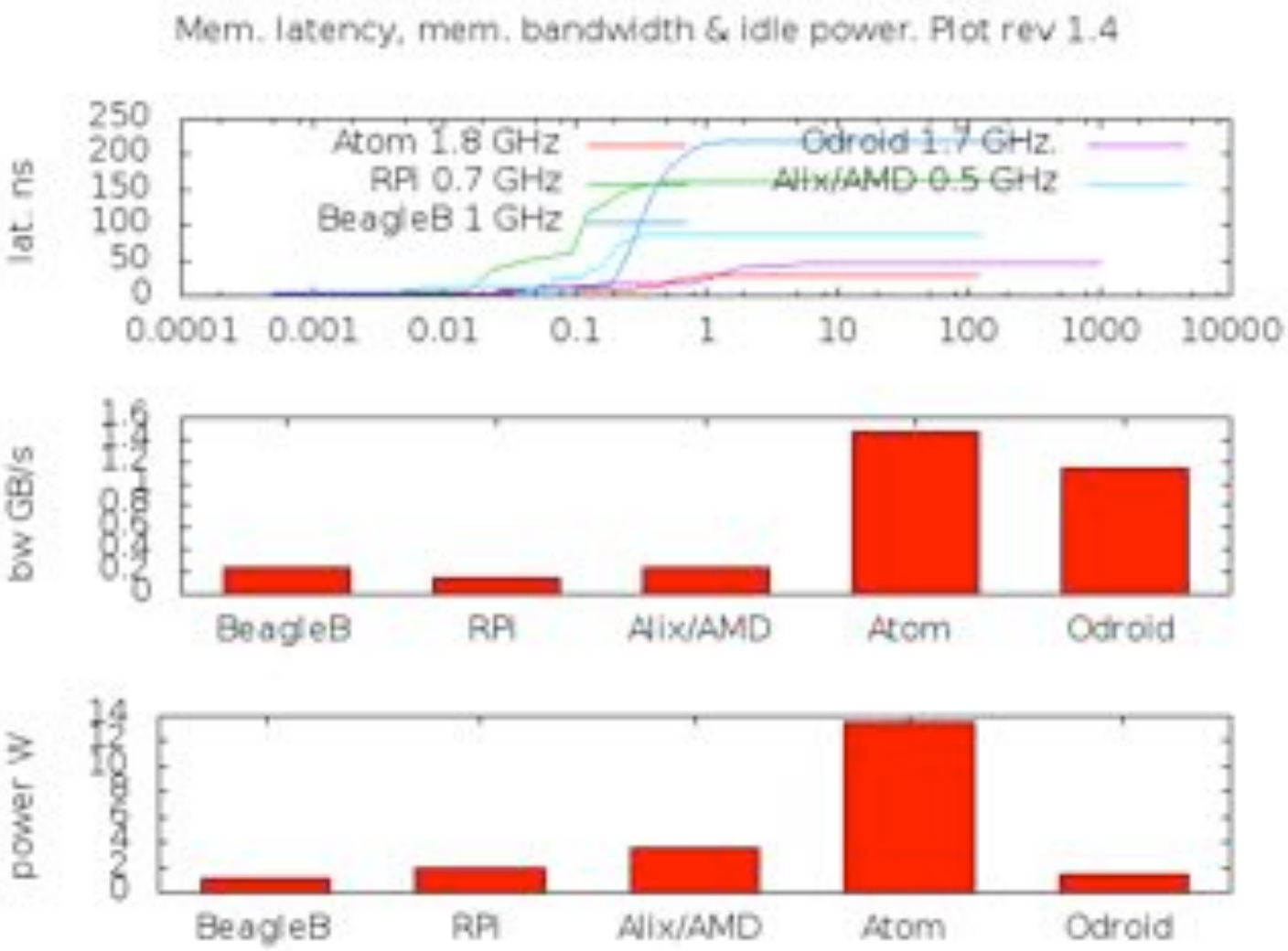
# ARM-based Fiber Router

- Odroid (Exynos5 quadcore)
- Customized Firmware (Minimum Debian + Bifrost)
- FiberGecko SPF
- Power Supply Unit


5.02V
0.89A

# Performance

- Memory Latency and Bandwidth


Mem. latency, mem. bandwidth & idle power. Plot rev 1.4
lat. ns
250
200
150
100
50
0
Atom 1.8 GHz
RPi 0.7 GHz
BeagleB 1 GHz
Odroid 1.7 GHz.
Alix/AMD 0.5 GHz
0.0001
0.001
0.01
0.1
1
10
100
1000
10000
bw GB/s
BeagleB
RPi
Alix/AMD
Atom
Odroid
power W
BeagleB
RPi
Alix/AMD
Atom
Odroid

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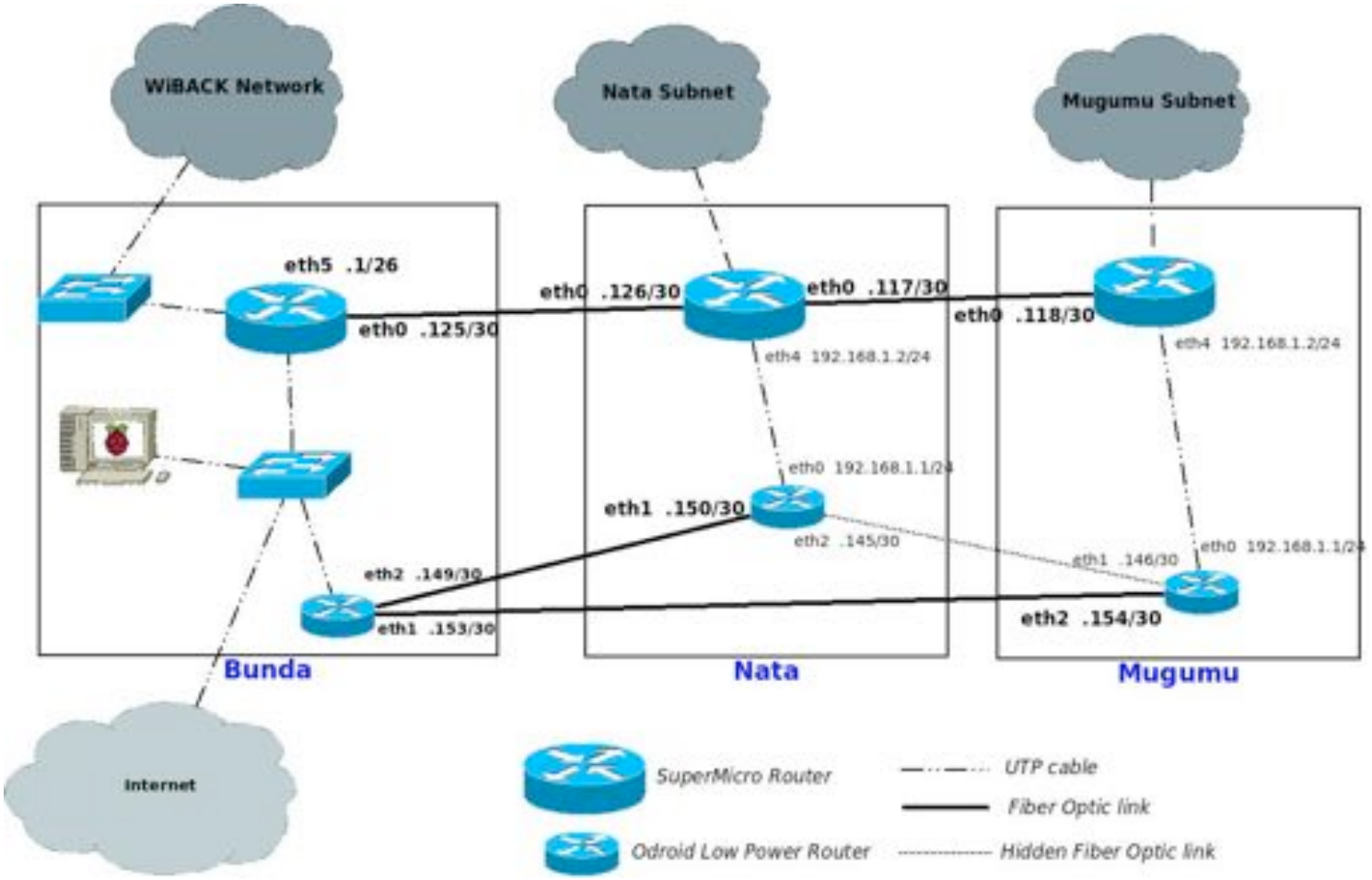
- Memory Latency and Bandwidth
- Packets forwarding speed: limited by USB
- 1000Mbps is possbile: 5Gbps at localhost
- Power consumption ~5W (<50nJ/bit)

# Three 5 Watts routers have been deployed in SBN



# Conclusion

- Impressive Reduction of Power Consumption
- Giga bit/s is still achievable

# THANK YOU!