



# „Minstrel-Blues“ Practical Joint Rate und Power Control in Linux mac80211

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# Problem



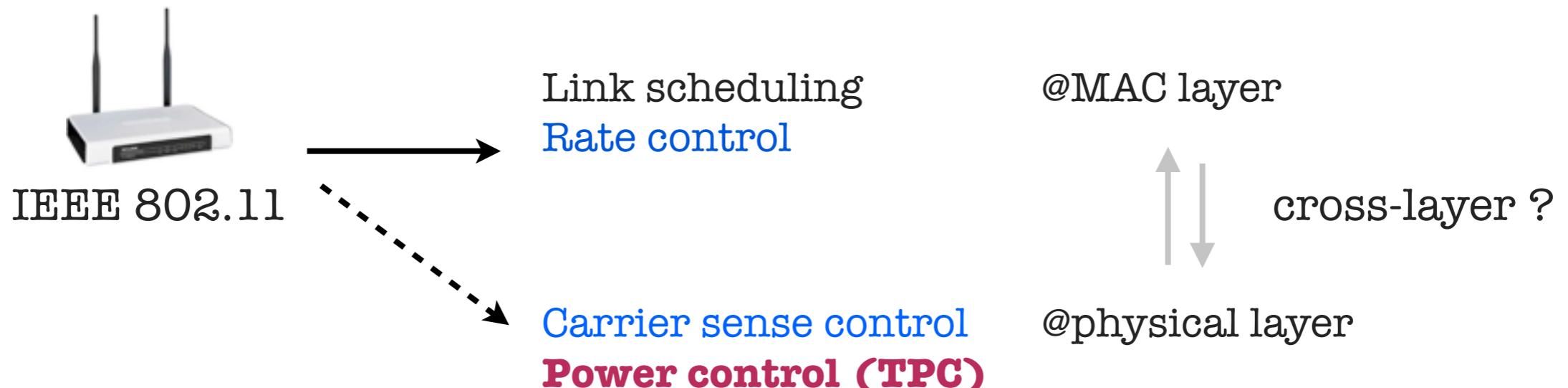
Wireless network capacity is bounded by interference

Can we increase the efficiency of WiFi spectrum usage ?

How to manage interference to increase spatial reuse ?

Can we fulfill regulatory TPC requirements (802.11h) ?

# WiFi Resource Allocation



Status quo:

**today's APs use a static (max) power level to all STAs**

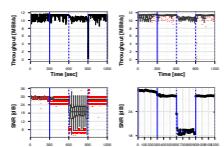
# Working parts of Minstrel-Blues



- Linux mac80211 extension to enable power level annotations in sample packets and rate-power table

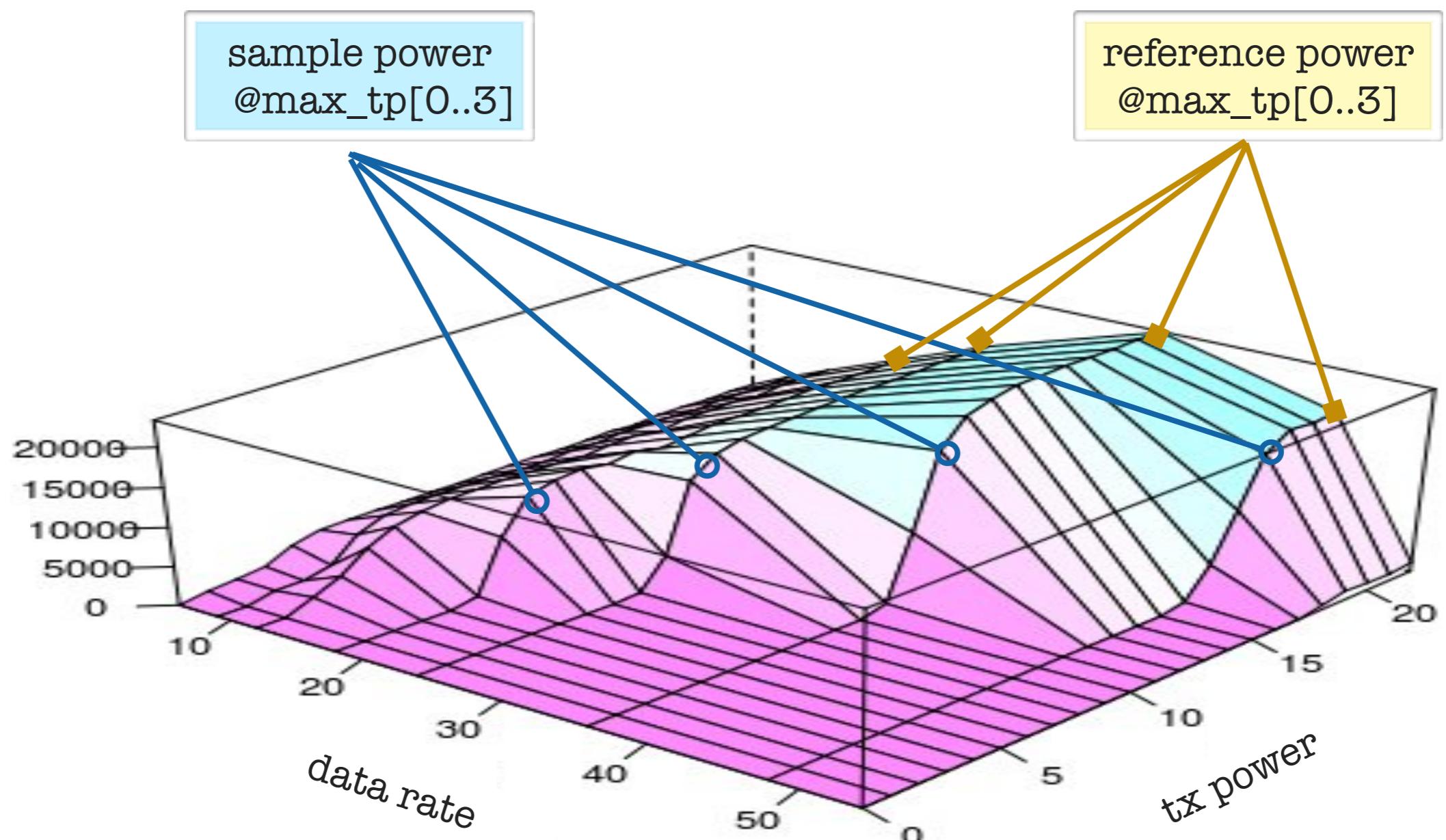


- Design and implementation of decentralized joint power & rate control per packet: “Minstrel-Blues”
  - working with Minstrel & ath5k & ath9k
- global Ack Power control
- new mac80211 driver flags (TPC per packet, per mrr, ACK)
- Weight your interference preference with a utility function

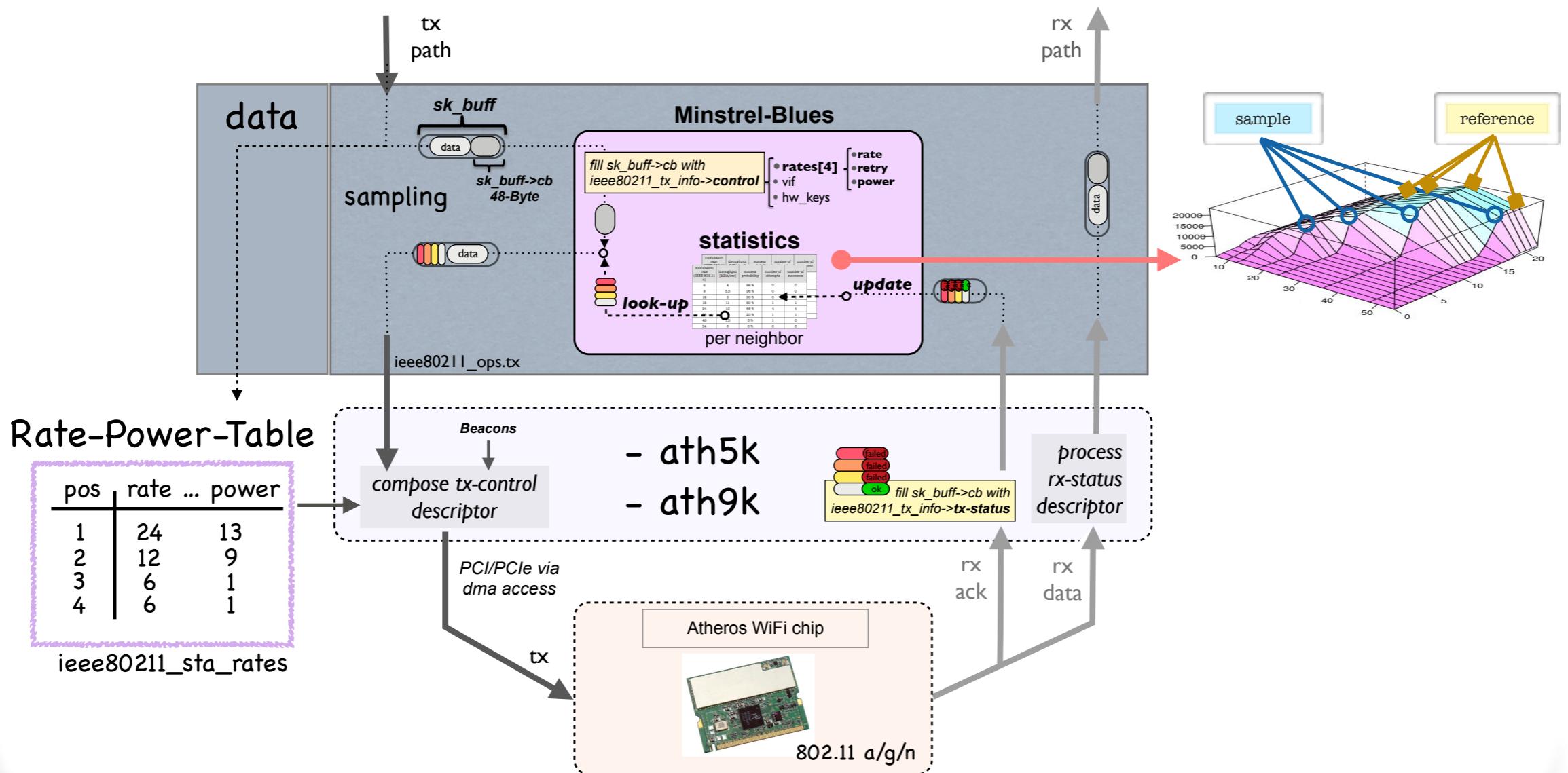


- Validation and Performance Analysis

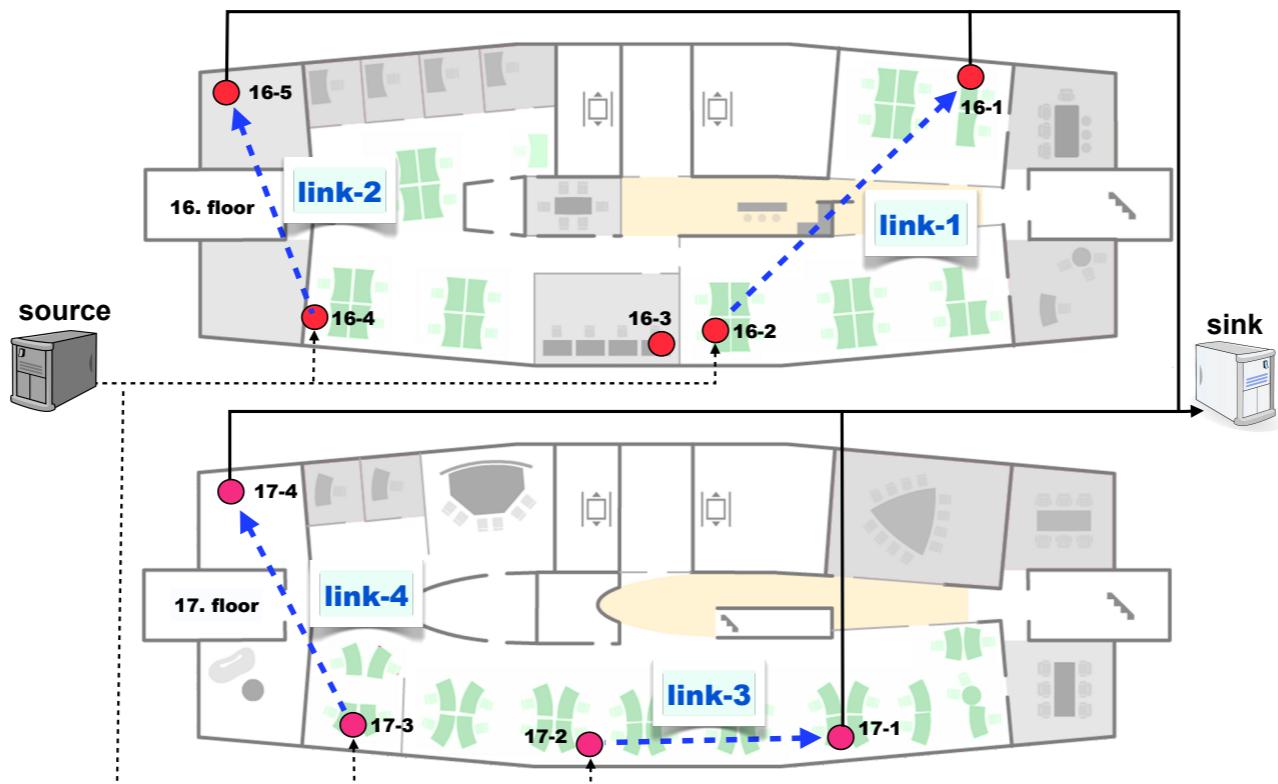
## Throughput as Function (rate,power)



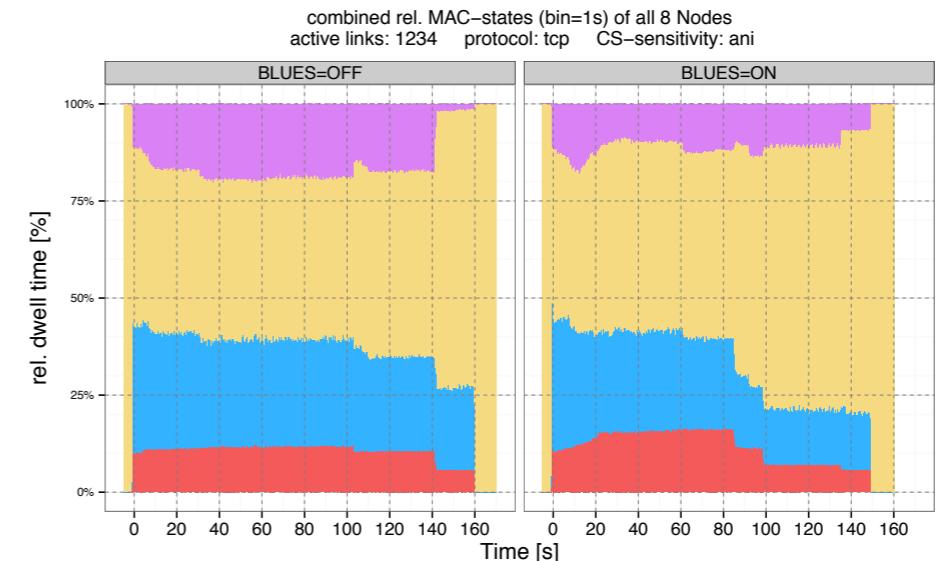
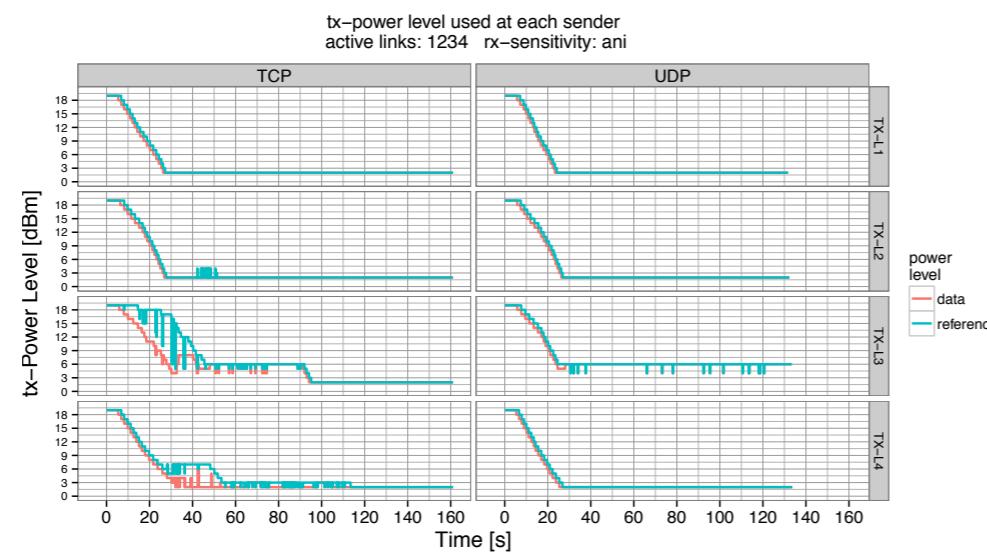
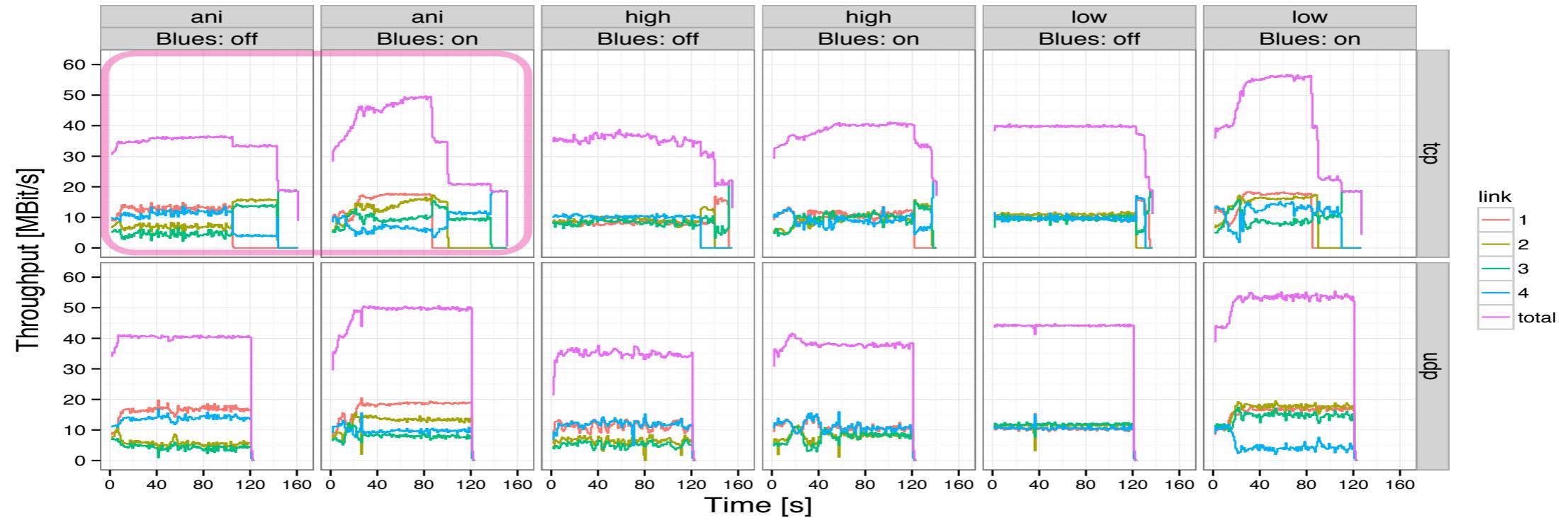
# new rate-power-table



# Performance with 4 active indoor links



## Throughput with active links: 1, 2, 3, 4



# Are you egoistic or altruistic ?

Data Rate	Thr. <sup>1</sup> [MBits]	Power [mW]
6	6.0	1
9	8.8	1
12	11.7	1
18	15.3	12
24	4.7	19
36	2.1	19
48	0.0	19
54	0.0	19

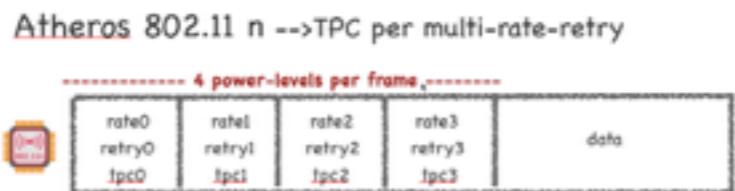


A joint decision based on preference is implemented !

# my current work:



- get everything in upstream shape !!!
- Blues integration in Minstrel\_HT



- since 3 weeks took a detour: enhancing Minstrel\_HT
- my performance patches get sent in the next days



- Full fledged Minstrel-Blues ... this year



Thank You !