IMPROVING THE POWER EFFICIENCY OF SURFWIRELESS

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· Distributed service, Managed Centrally
· SURFnet ensures Wireless Connectivity
· Interconnected with LAN of institute

Figure: SURFwireless[1]
· Green IT
· Wireless connectivity provided 24/7
· SURFwireless real-time central monitoring
Research question

How can existing mechanisms be leveraged to maximise the power efficiency of distributed Access Points in a wireless infrastructure?

- How does one measure accurately the power consumption of each Access Point?
- What solutions are available and applicable to accomplish a lower energy usage of Access Points in SURFwireless?
MEASURING POWER CONSUMPTION
INFRASTRUCTURE AT SURF*

- Initial goal: all SURFwireless customers
- SURFnet, SURF, and SURFmarket
- Juniper PoE EX4300
- Aerohive AP230
- 33 distributed Access Points

Not everywhere same setup
Option 1  Physical device

Option 2  SNMP - Juniper PoE switches & APs do not have the right MIBs

Option 3  Juniper telemetry function
  · Measure consumption at the port
  · Reports current consumption per 5 minutes. 24 hours long
  · Multiple days
**MEASURING PROCESS (2/2)**

- **Clumsy** configuration
- **28** Access Points showed results
- **No simple** method to measure at every location

```
measured power consumption

```
```
ex4300-48Poeplus1> show poe telemetries interface all count all | no-more
Interface  Sl No  Timestamp          Power  Voltage
ge-0/0/5   1     2016-10-26 15:30:10 UTC 7.1W    55.6V
2          2     2016-10-26 15:25:10 UTC 7.1W    55.6V
3          3     2016-10-26 15:20:10 UTC 7.3W    55.6V
4          4     2016-10-26 15:15:10 UTC 7.1W    55.6V
5          5     2016-10-26 15:10:10 UTC 7.3W    55.6V
6          6     2016-10-26 15:05:10 UTC 7.3W    55.6V
7          7     2016-10-26 15:00:10 UTC 7.1W    55.6V
```
RESULTS
Figure: Comparison average weekday with weekend
Figure: Average total consumption per hour
MECHANISMS
DISABLING ACCESS POINTS

- Radio-on-Demand
- Long boot times e.g. Aerohive AP230 77 seconds
- Wake-up mechanism
HARDWARE REQUIREMENTS

- External wireless receiver
- Custom made Access Points
- Extra devices which also require electricity
· High-density topology in mind
· Wireless Devices and APs send network quality reports
· Minimising wireless signal for sufficient RSSI
COMMERCIAL OF THE SHELF

- Aruba Networks
  - Intelligent Power Monitoring
- Cisco Systems
- Ruckus Wireless
- Aerohive Networks
  - Email contact
  - Software feature to schedule APs
CONCLUSION
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- Complex measuring process
- High idle consumption, other type of APs might lower this
- Not a lot of effort in improving the power efficiency
- No simple applicable method to measure and improving the power efficiency available
Questions?