IMPROVING THE POWER EFFICIENCY OF SURFWIRELESS

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System and Network Engineering - UvA

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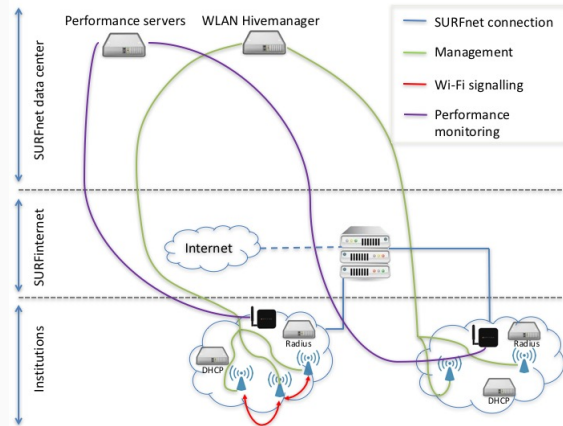- Interconnected with LAN of institute

Figure: SURFwireless[1]

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- Green IT
- Wireless connectivity provided 24/7
- SURFwireless real-time central monitoring

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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

- 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
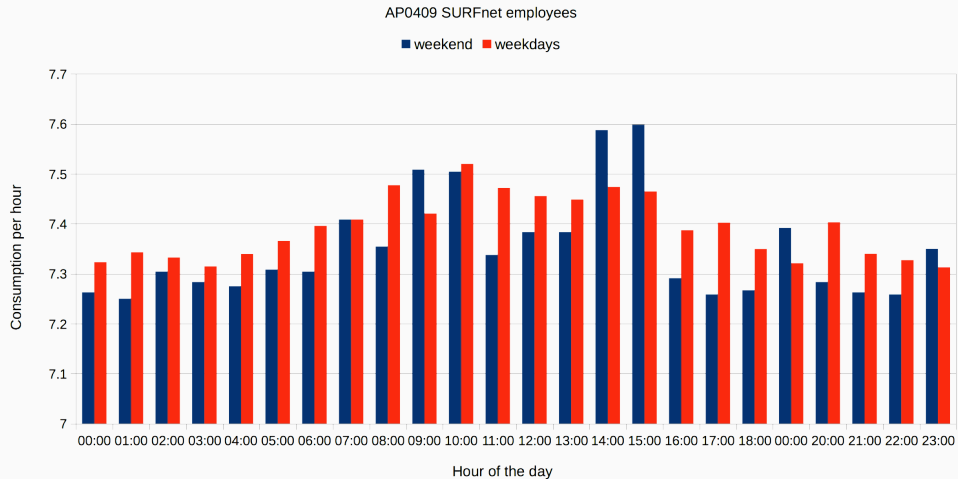- Multiple days

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

```
ex4300-48PoEplus1> show poe telemetries interface all count all | no-more
Interface  Sl No   Timestamp               Power   Voltage
 ge-0/0/5    1      10-26-2016 15:30:10 UTC 7.1W    55.6V
             2      10-26-2016 15:25:10 UTC 7.1W    55.6V
             3      10-26-2016 15:20:10 UTC 7.3W    55.6V
             4      10-26-2016 15:15:10 UTC 7.1W    55.6V
             5      10-26-2016 15:10:10 UTC 7.3W    55.6V
             6      10-26-2016 15:05:10 UTC 7.3W    55.6V
             7      10-26-2016 15:00:10 UTC 7.1W    55.6V
```
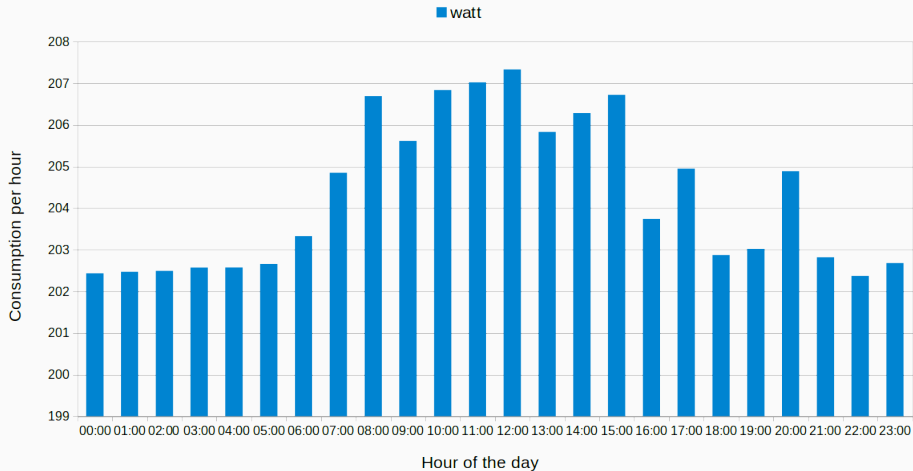
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RESULTS

AP0409 SURFnet employees

■ weekend   ■ weekdays

Figure: Comparison average weekday with weekend

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Figure: Average total consumption per hour

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MECHANISMS

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

- 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

- Aruba Networks
    - Intelligent Power Monitoring
- Cisco Systems
- Ruckus Wireless
- Aerohive Networks
    - Email contact
    - Software feature to schedule APs

CONCLUSION

- **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**

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SURF
NET

Questions?

📄   SURFnet. (2016), The technology behind surfwireless, SURFnet, [Online]. Available: `https://www.surf.nl/diensten-en-producten/surfwireless/index\%5B2\%5D/index.html` (visited on 12/18/2016) (cit. on p. 2).