COAP: A Software-Defined Approach for Managing Residential Wireless Gateways



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Wireless Devices at Homes

MOTIVATION

- WiFi deployment in dense residential settings
 - Unorganized deployment
 - Heterogeneous hardware
 - Many neighboring APs (20 60 SSIDs)
 - Multiple WiFi / non-WiFi devices
 - Lack of user experience in managing devices
 - No co-ordination between neighboring APs

Potential problems at homes

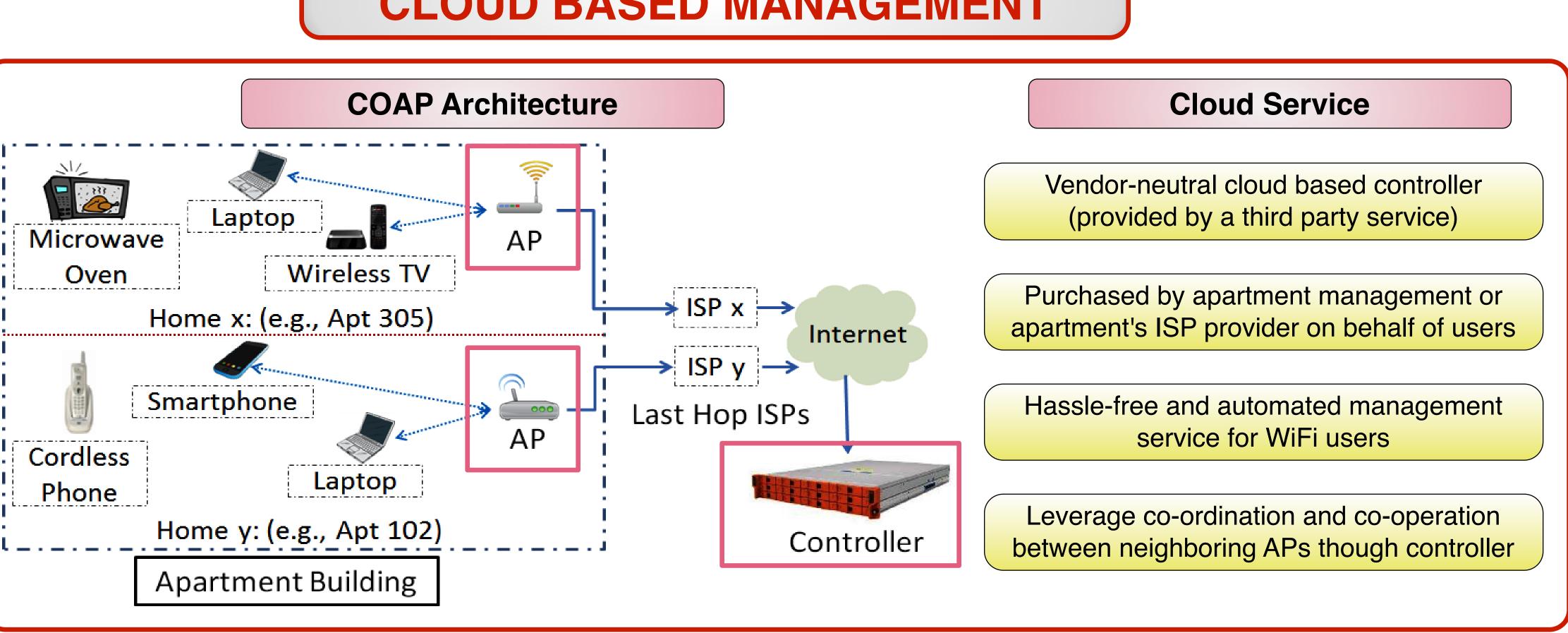
- Router configuration
- Environmental effects
- Wireless Interference
- Non-WiFi interference

COAP FRAMEWORK

Access Point (APs 1n)
AP specific interfaces (e.g., luci) airshark click
(APConfigManager) (DiagnosticStatsReporter) (BasicStatsReporter)
OpenFlow _A modules
Floodlight modules
ConfigManager COAPManager StatsManager
↓
History Logs
Cloud Based COAP Controller
Controller Applications
 Automated remote AP configuration Per-AP neighborhood map to determine activity in the vicinity of each AP. Interference detection and mitigation Context aware management (e.g., traffic, client device type, time of day)

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CLOUD BASED MANAGEMENT



COAP API

Vendor-neutral APIs exposed by COAP APs

APConfigManager

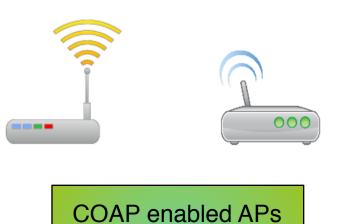
- SetParameter(channel, power)
- SetAirtimeAccess(slotDuration, transmitBitmap)

BasicStatsReporter

- GetNeighborInfo()
- GetAirtimeUtilization()
- GetClientInfo()
- GetLocalLinkStatistics()
- GetTrafficInfo()

DiagnosticStatsReporter

GetNonWifiDevices()



(Open API implemented across multiple vendors.)



EXAMPLE APPLICATION

