IoT Security for Commercial Buildings

Fairhair Alliance

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From silos to all-IP

The benefits of an IP-based infrastructure for commercial buildings

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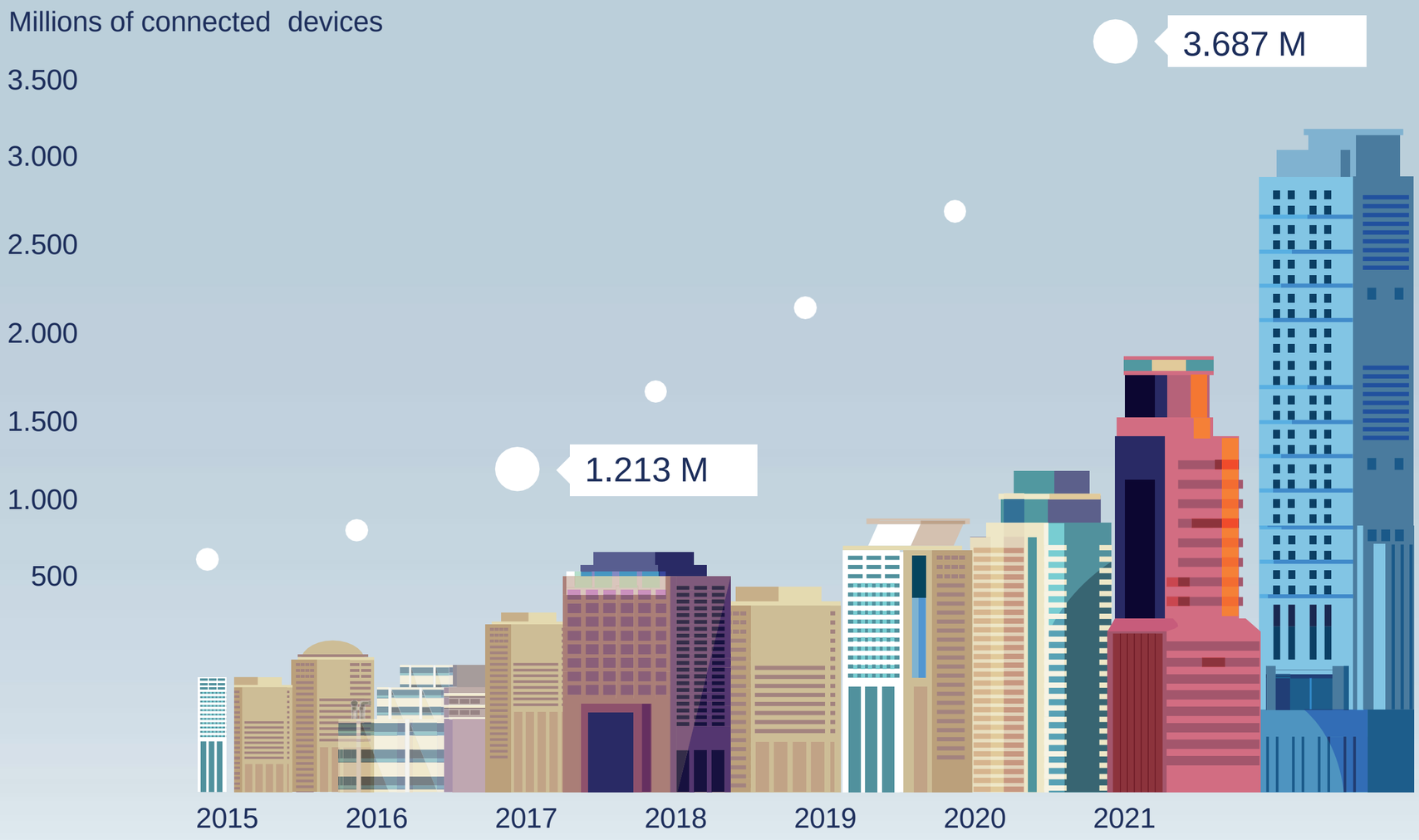
Connected devices in commercial buildings



In 2017 the number of connected devices in commercial buildings surpassed the mark of 1 billion.
By 2021 this number will grow to more than 3,6 billion devices.

Source: The Internet of Things in smart connected buildings 2016 – 2021, Memoori Smart Building Research 2016

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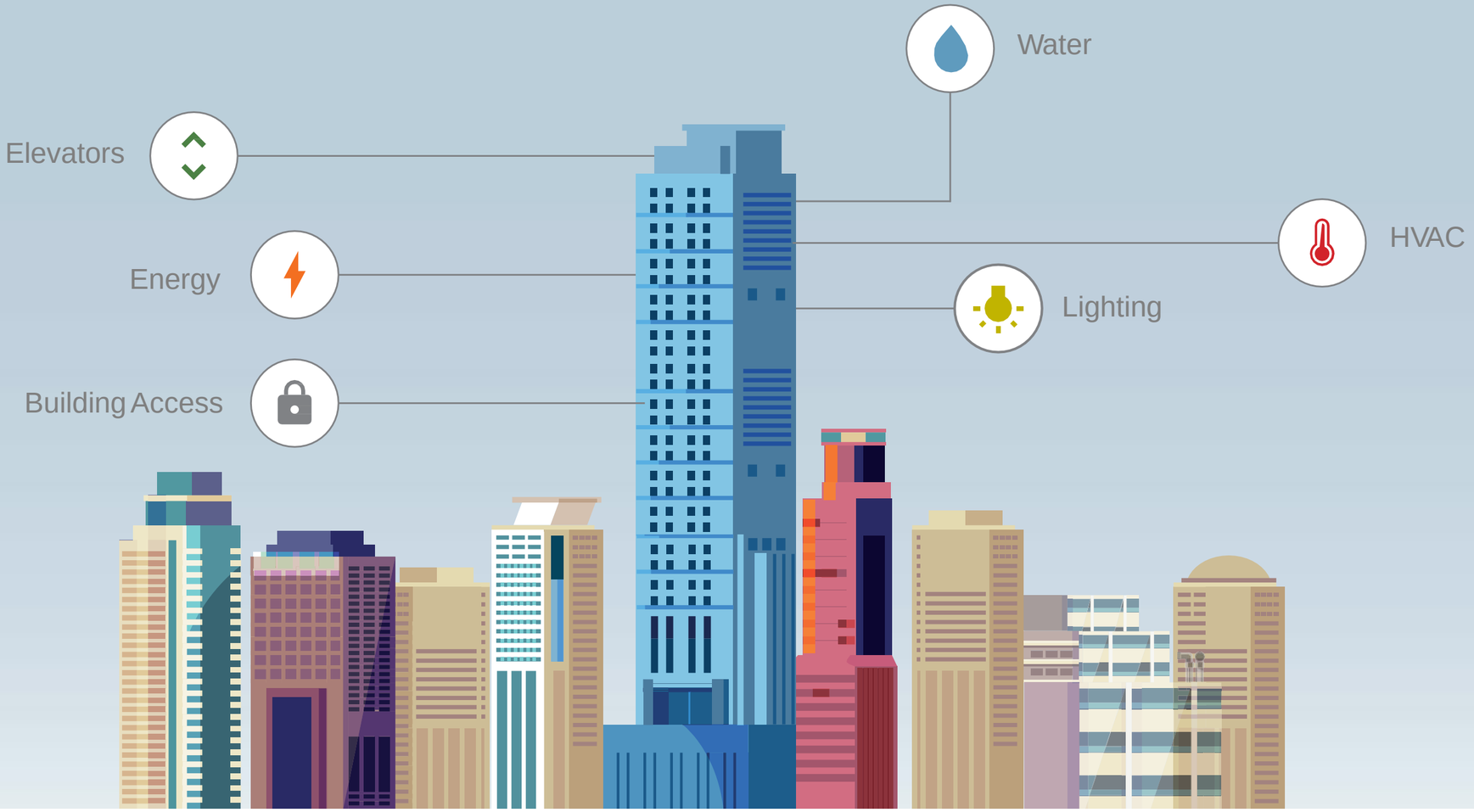
Today: Building technologies in silos ...



However – even though there are so many connected devices, applications for Smart Buildings remain in silos, each with their own proprietary solutions.

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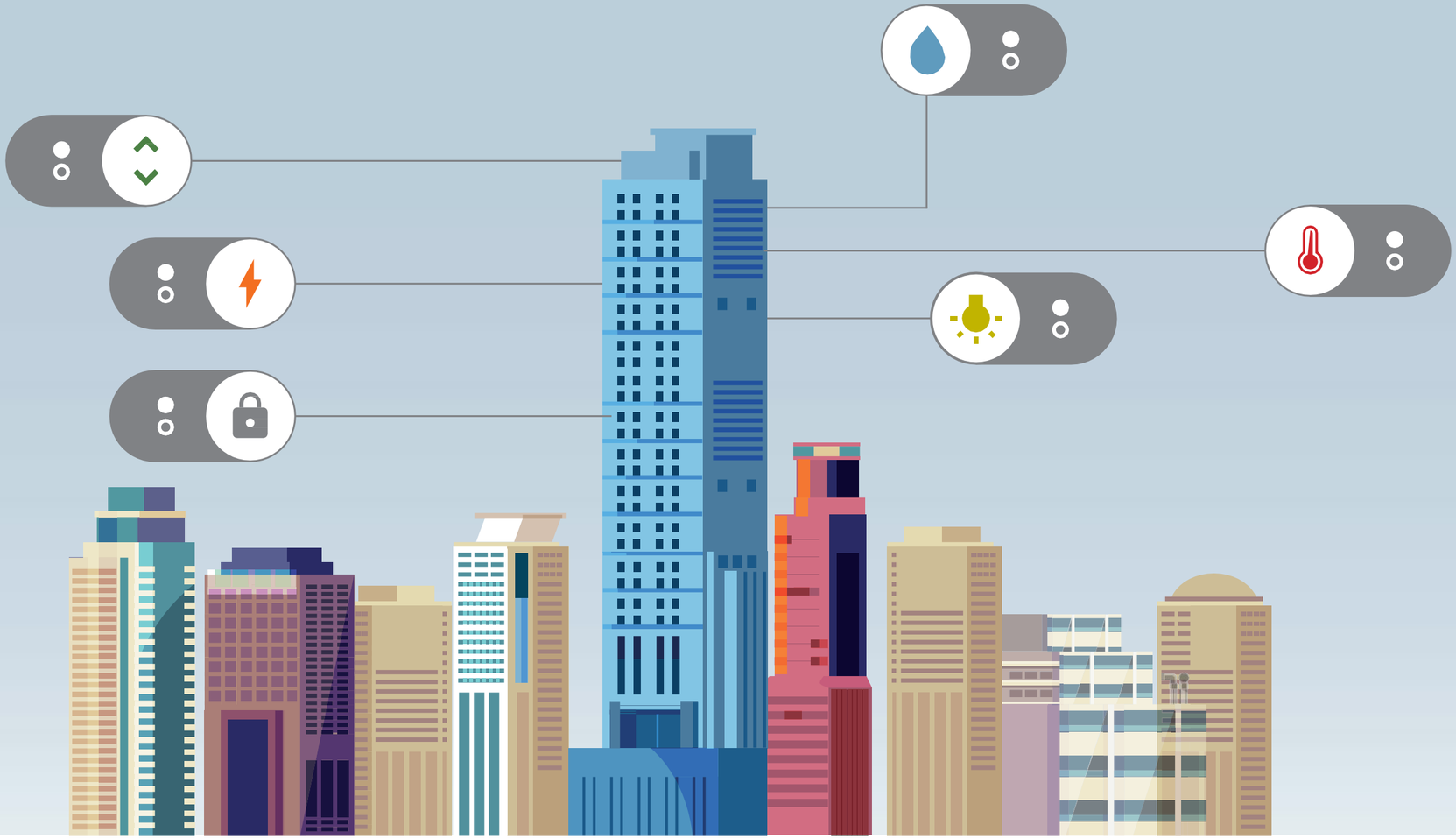
... each with their own proprietary technology and independent controls.



However – even though there are so many connected devices, applications for Smart Buildings remain in silos, each with their own proprietary solutions.

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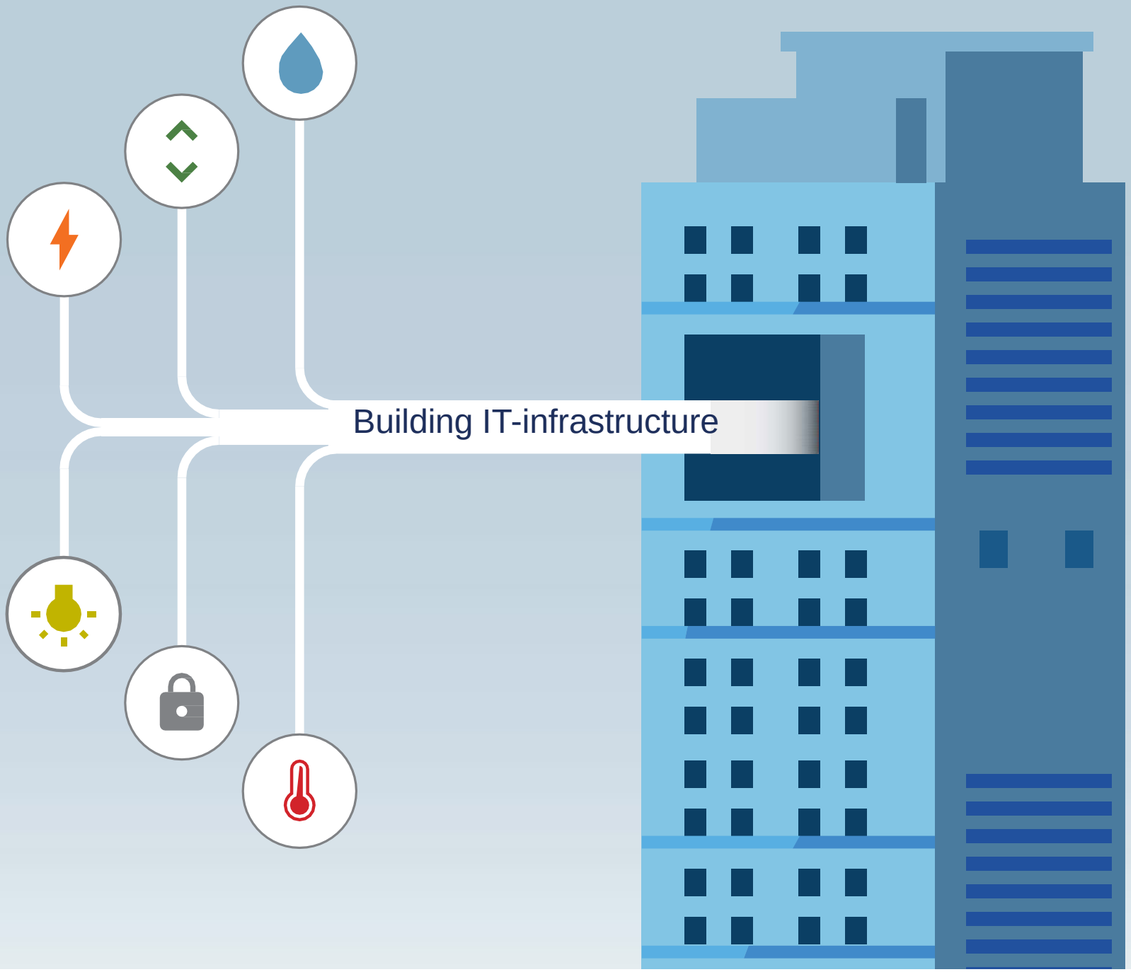
Trend: Convergence of building systems with IT...



Converging lighting control and building management systems with IT into an all-IP-based configuration will break down these barriers by making every data point accessible via an IP address.

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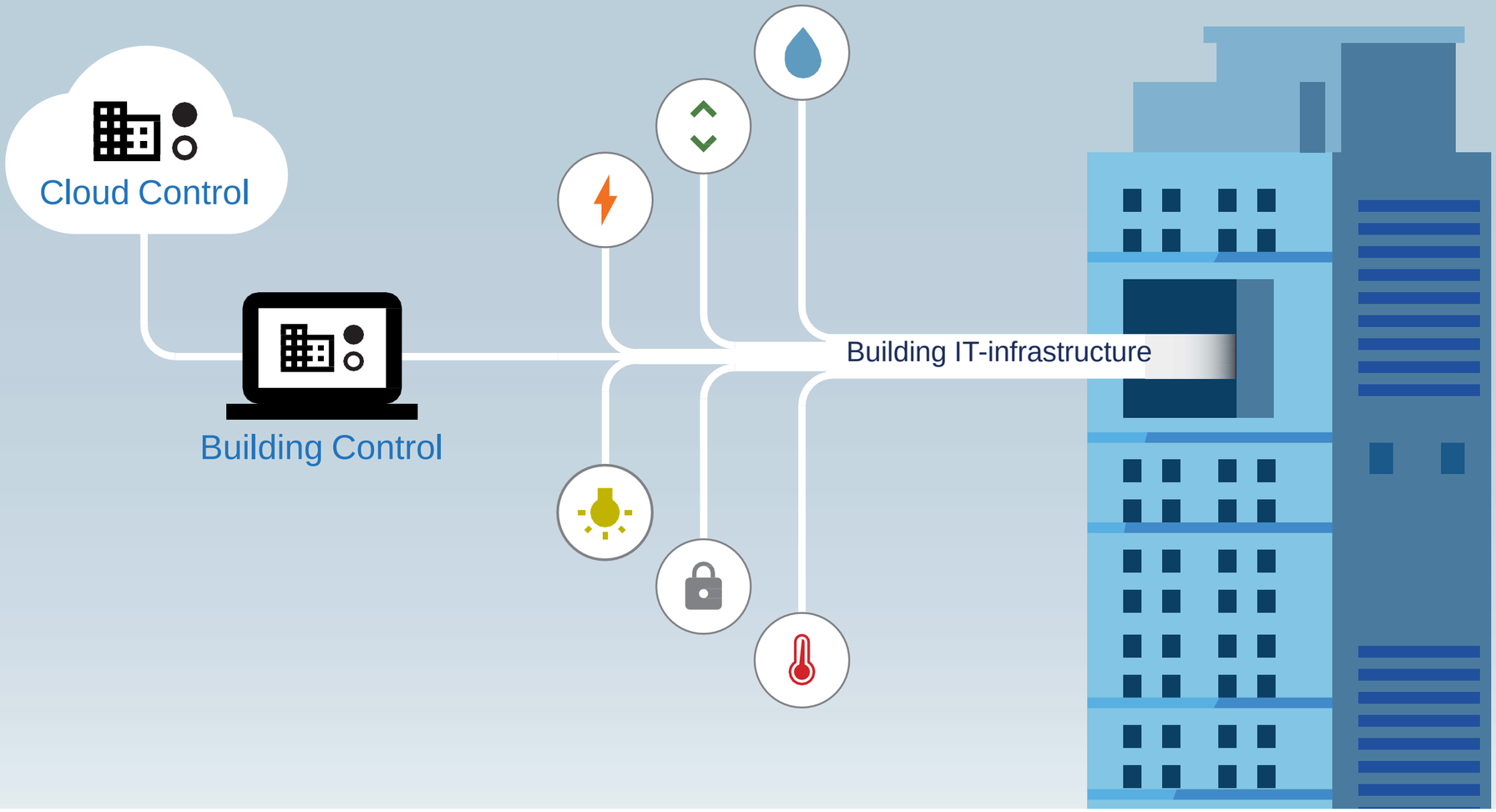
... facilitates IoT for commercial buildings ...



Each data point and sensor will be able to communicate and interact with each other and benefit from end-to-end security for all connected devices.

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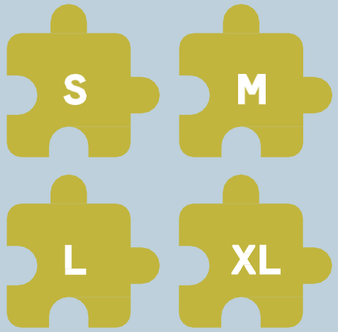
... enabling new business opportunities.



Scalability

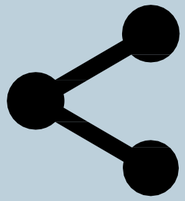
From small, single devices to large multi-building projects

Security

Unified end-to-end security approach

Efficiency

Centralized remote control over all building operations



Interoperability

Seamless integration of multiple physical media

Each data point and sensor will be able to communicate and interact with each other and benefit from end-to-end security for all connected devices.

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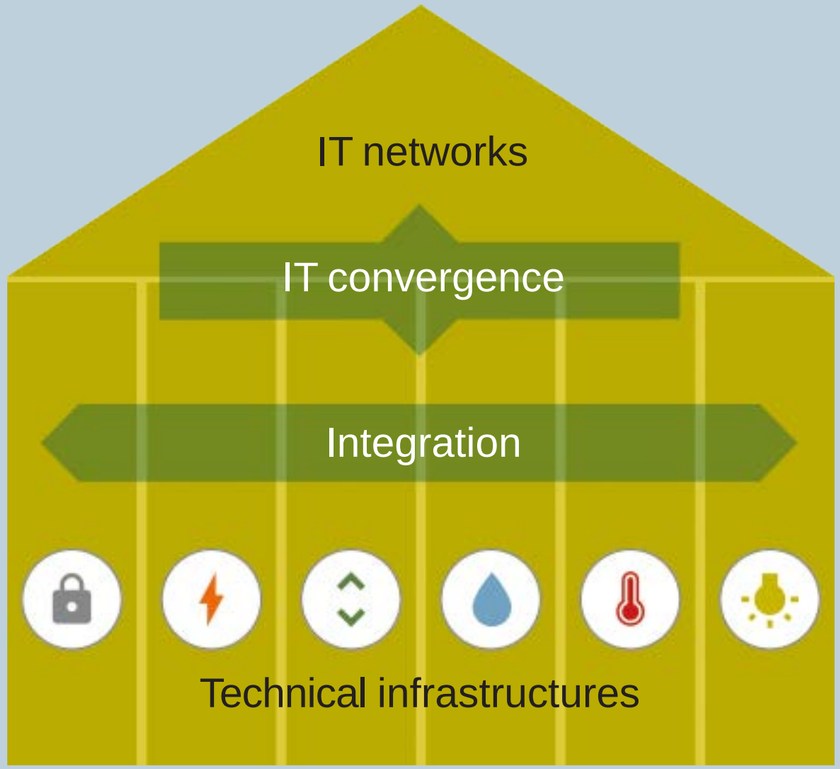
Convergence: High-level technical requirements



- IP-based infrastructure with seamless integration with IT networks and smart devices.
- Compliance to IT security practices and policies (enterprise-grade security)
- Support for secure point-to-point & group communication
- Usability with multiple IP media (e.g. wireless LAN, Ethernet, Thread)
- Usability with multiple IP-based application layers (ecosystems)

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The Fairhair solution

Facilitating the IoT for commercial buildings
by introducing a common IP-based infrastructure
for building control

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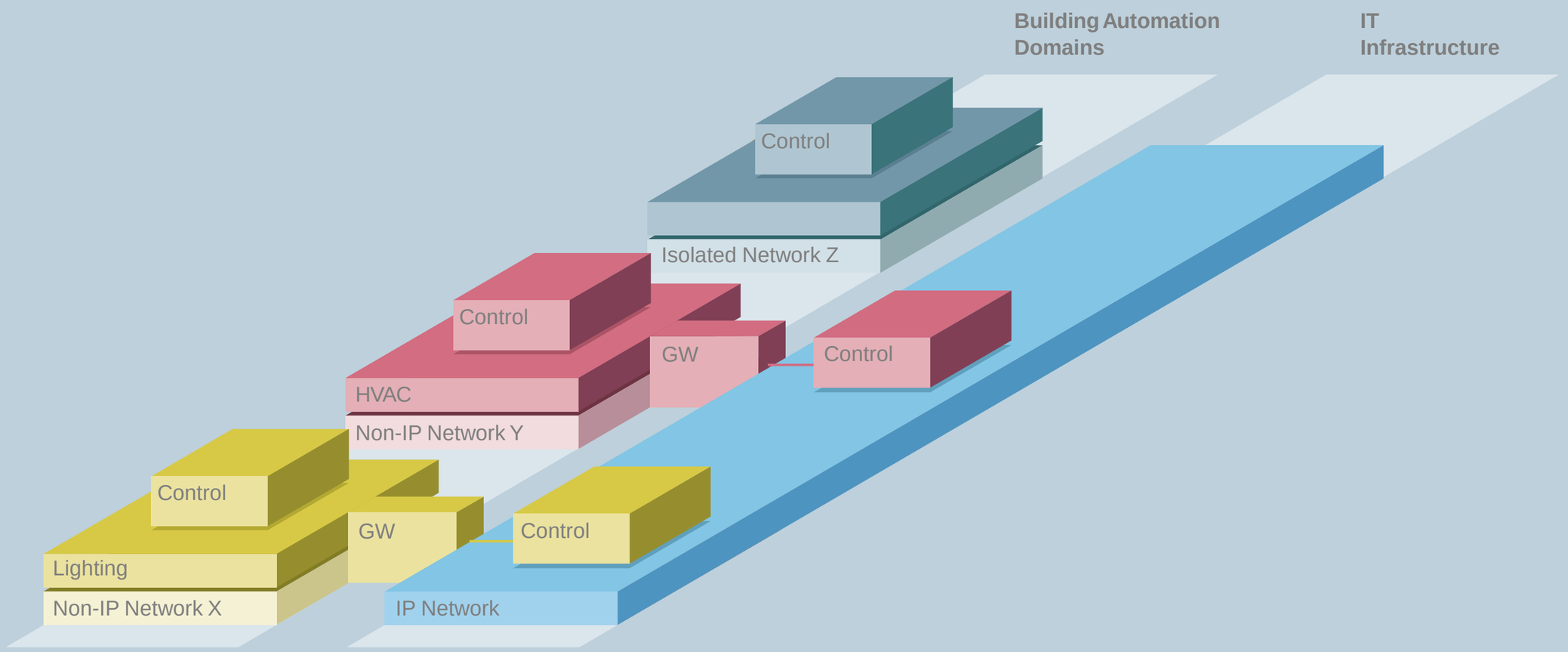
Today: Isolated building-automation domains



Each domain requires a gateway (GW) to translate proprietary protocols into IP. The building administrator has limited control over individual devices in each domain, and provisioning is complex.

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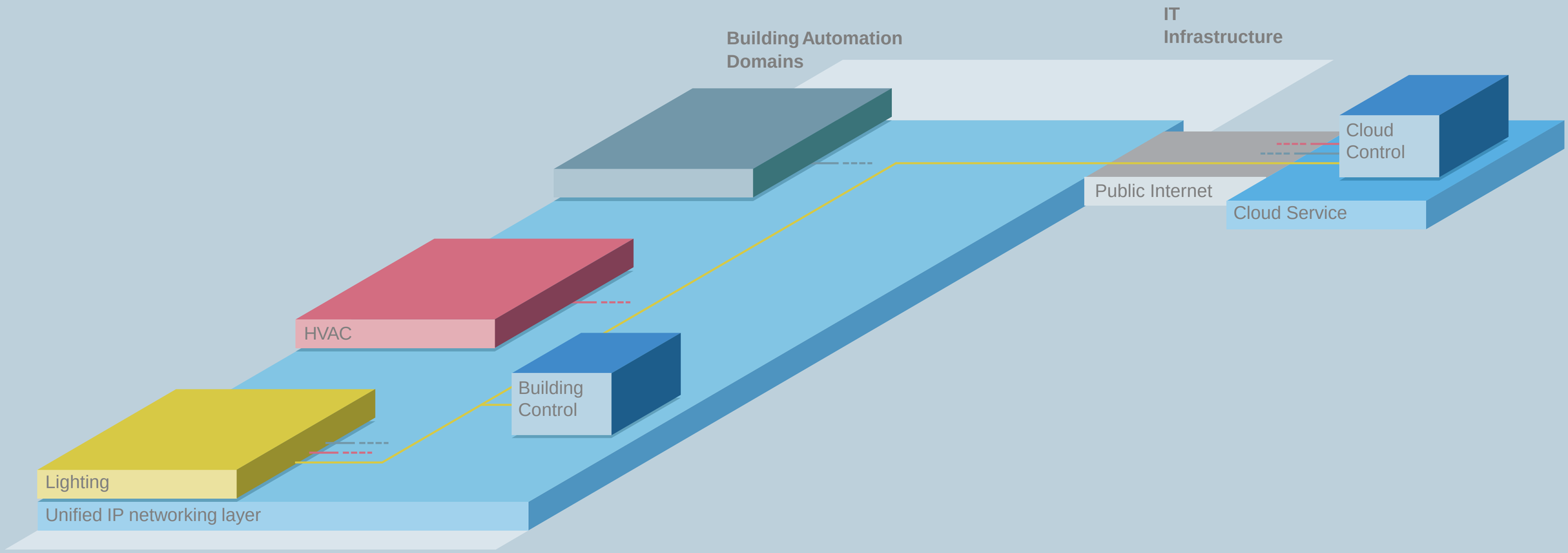
Fairhair model: Common IP-based infrastructure enabling cloud monitoring and security



Fairhair's Vision...Building administrators gain streamlined control over application domains, with real-time monitoring, simpler provisioning, and the possibility to extend this to multiple buildings through the cloud.

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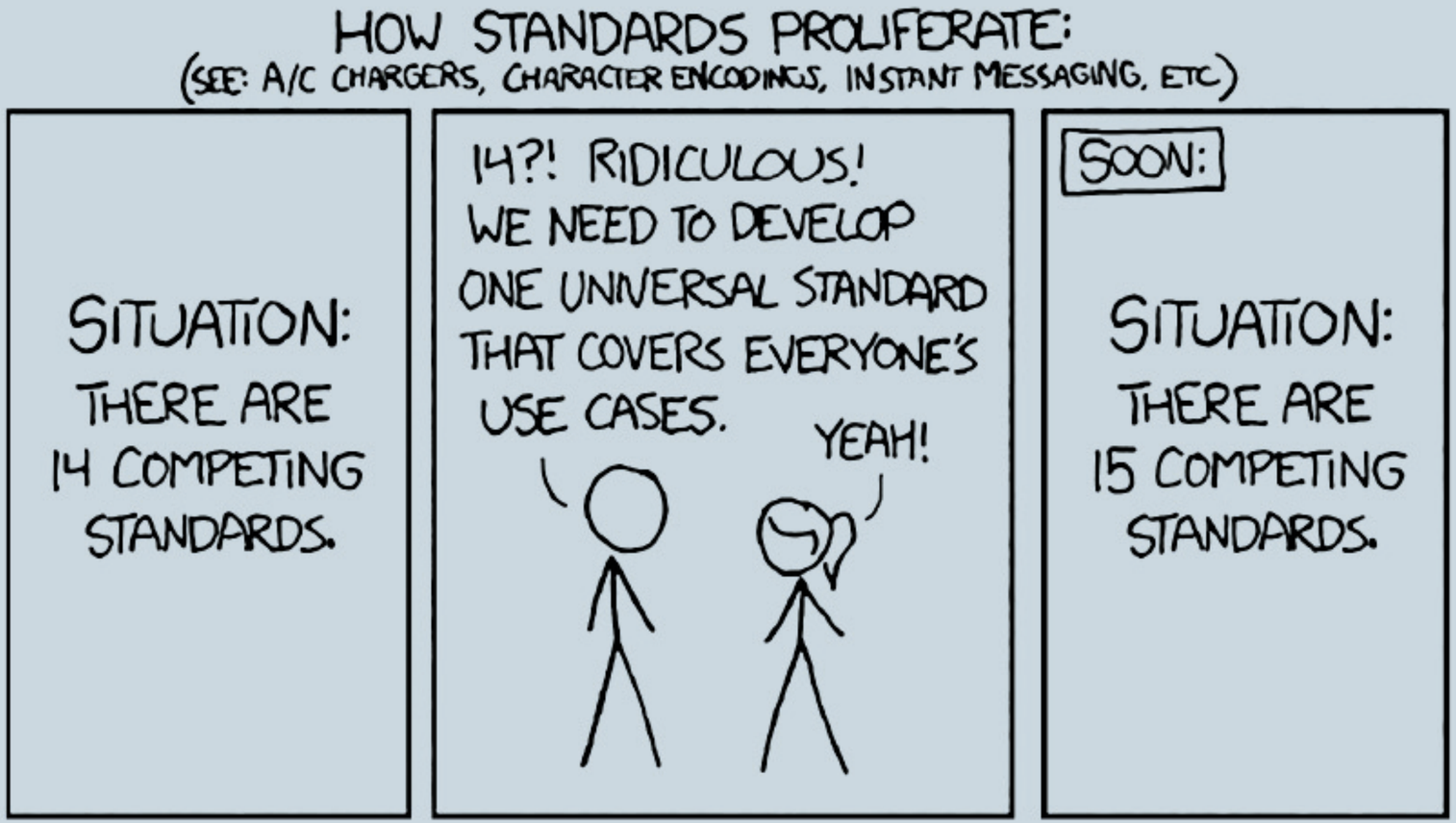
Another IoT protocol standard is not the solution



Source: https://xkcd.com/927

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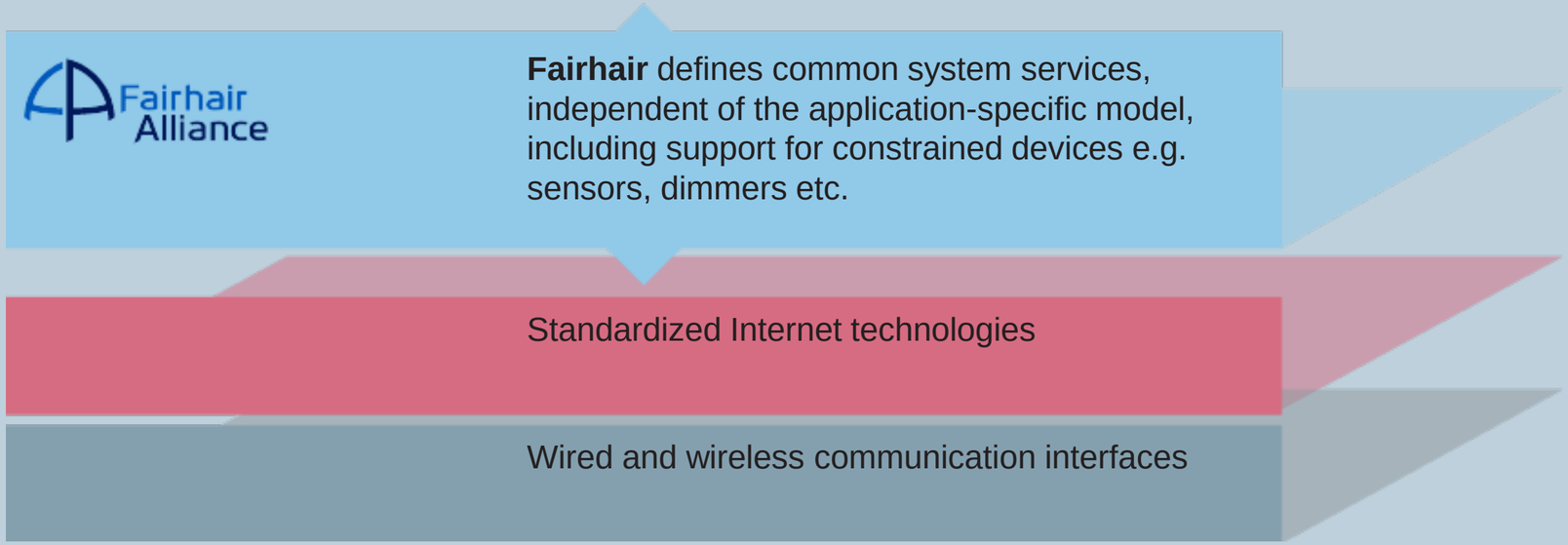
Fairhair’s approach: adapting existing IP technologies to the requirements of building control...



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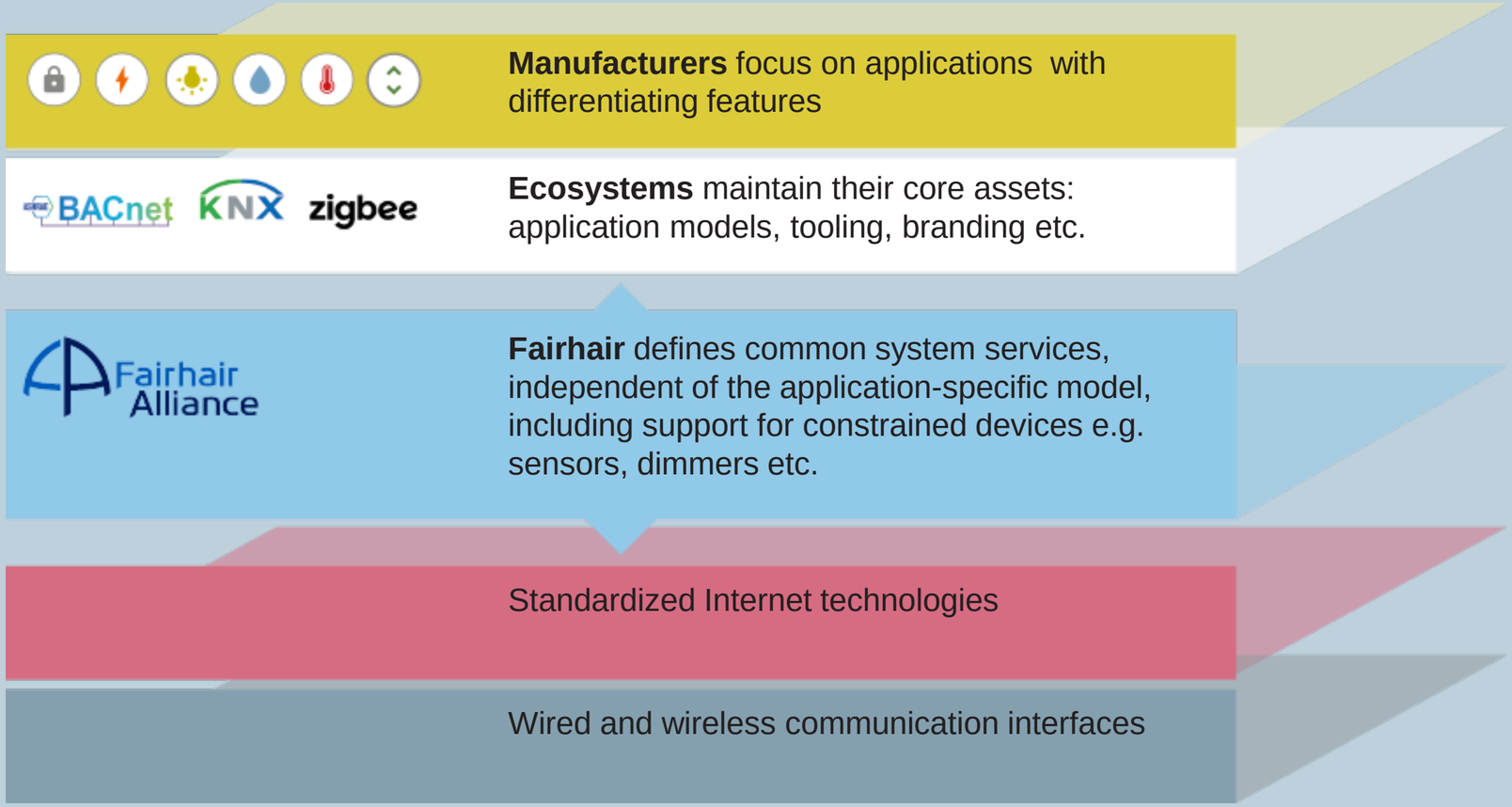
... enabling successful ecosystems and building applications for the IoT



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Security: A more open, IP-based environment brings risks

The security risks inherent to a more open, IP-based environment are addressed by Fairhair's security specification.

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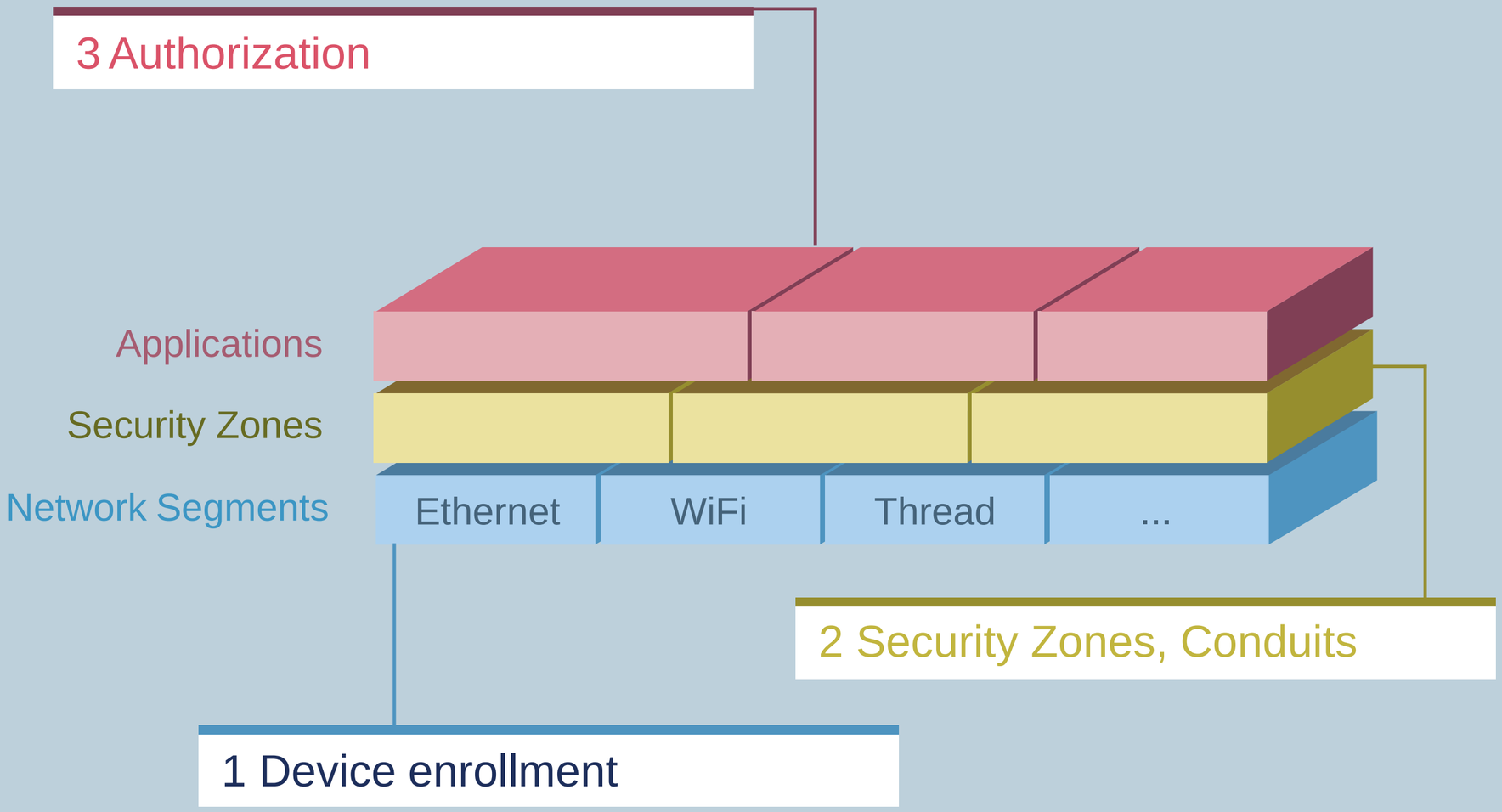
Fairhair’s security architecture



The security risks inherent to a more open, IP-based environment are addressed by Fairhair’s security specification.

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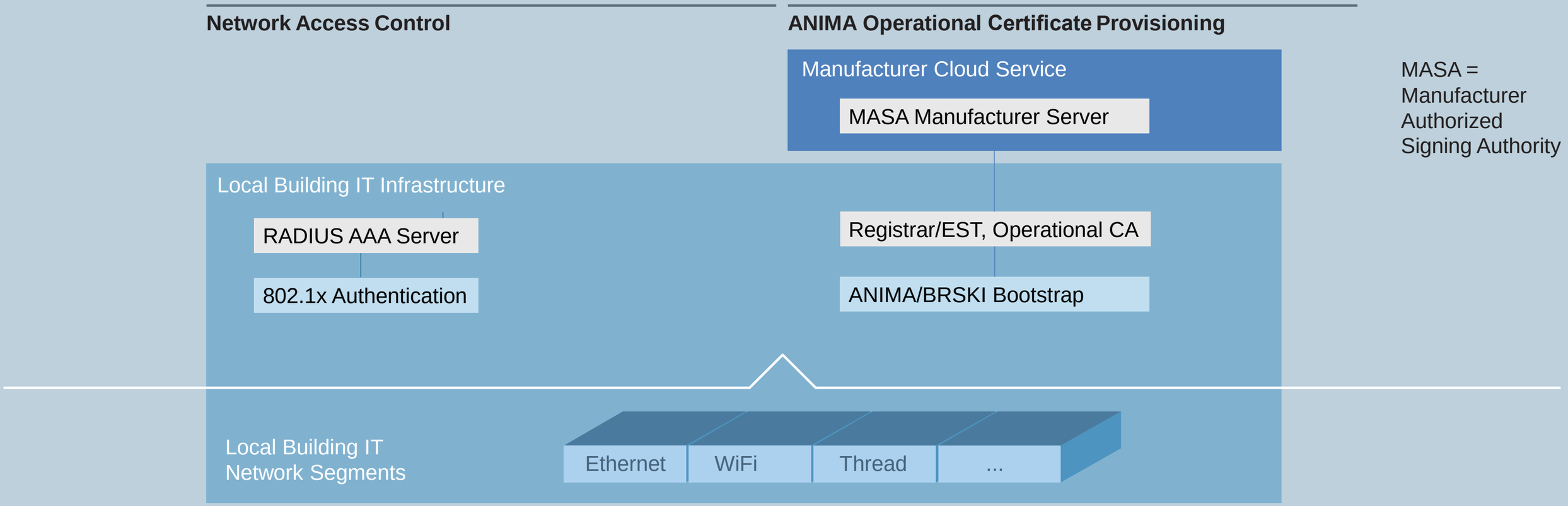
1 Device enrollment

- Using certificate-based identities
- Gives control over which devices are allowed to join the building infrastructure
- Provisions operational identities of devices



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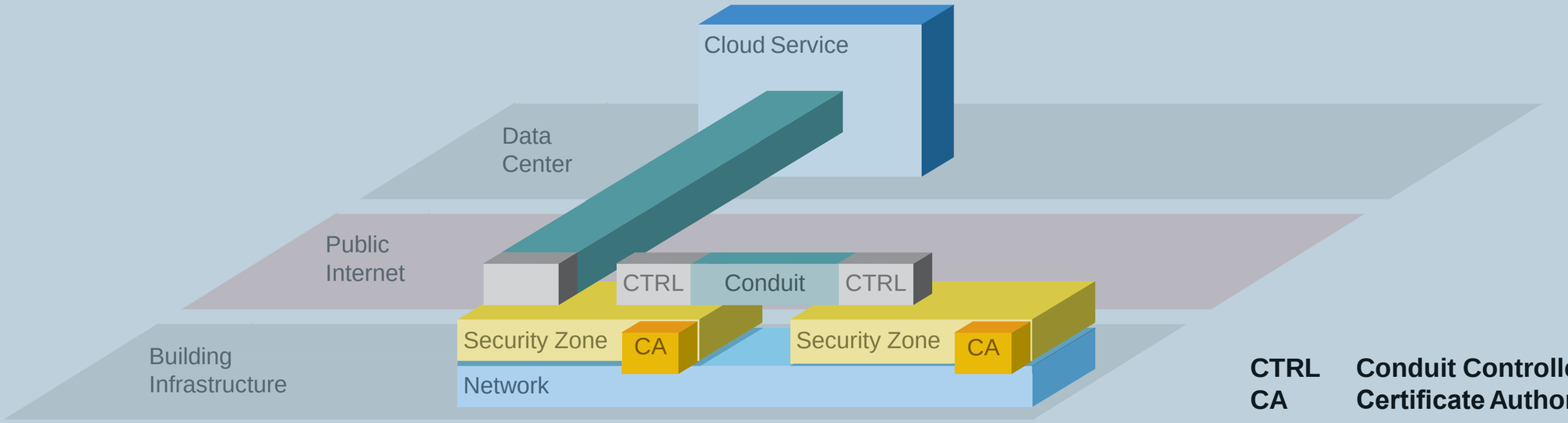
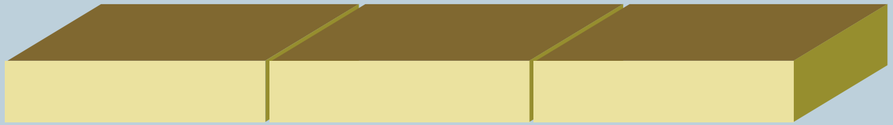
2 Security Zones, Conduits

- Operational, administrative security zones
- Based on operational identities of devices
- Mutually authenticated, secure channels between devices and zones



CTRL **Conduit Controller Device**
CA **Certificate Authority**



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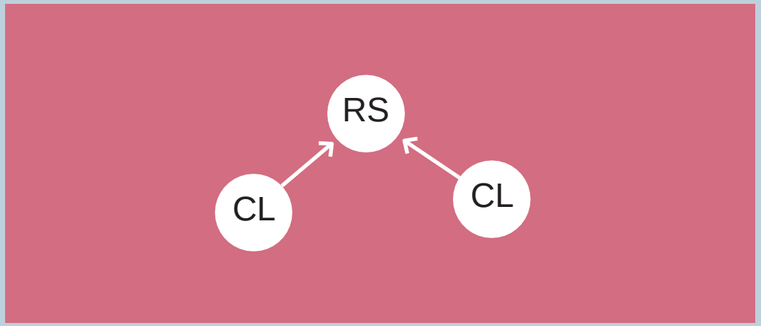
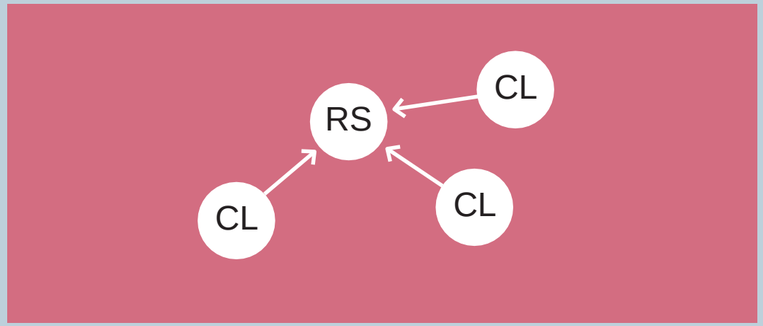
3 Authorization

- Assigned to operational identities of devices
- Devices register their available resources
- Authorization server enforces what resources other (client) devices are allowed to control/access

Tokens Scope A



Tokens Scope B



CL Client
RS Resource Server

Applications

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How are Fairhair’s specifications applied?

Next steps towards a common IP-based infrastructure for commercial buildings

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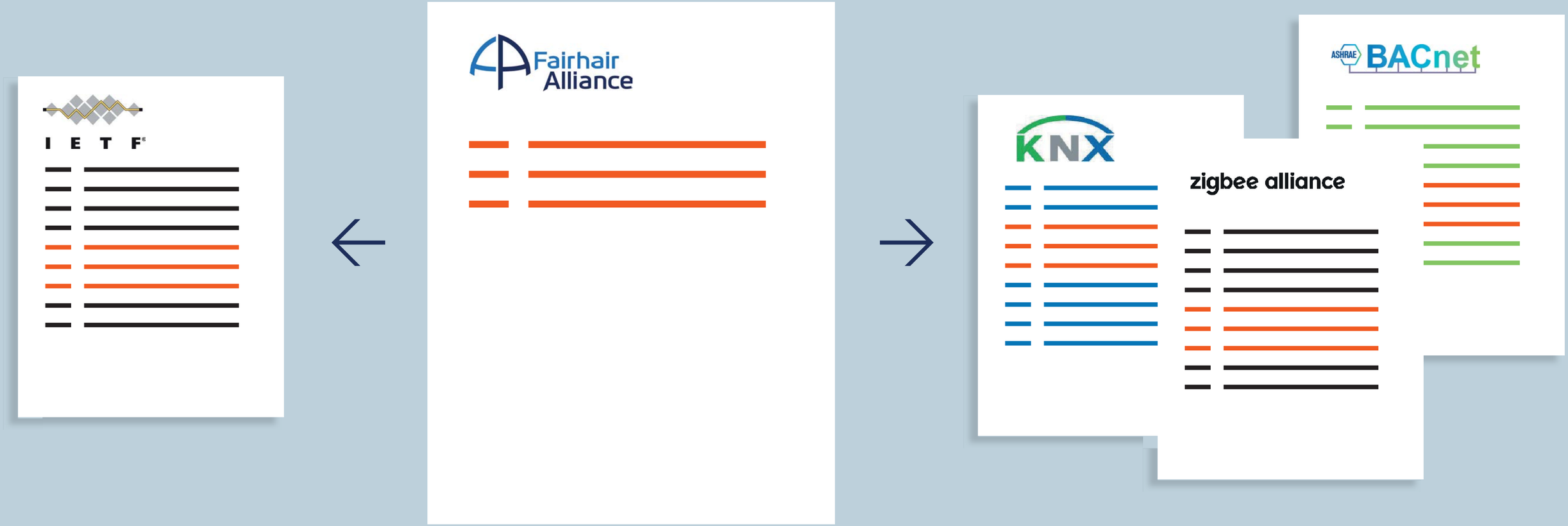
Next steps – How are Fairhair’s specifications used?

Fairhair Alliance defines common system services, independent of the application-specific model:

- Security architecture (enterprise-level)
- Description of device functionalities
- Discovery of devices and their resources

Next steps – How are Fairhair's specifications used?



We envisage that the major ecosystems will implement Fairhair's technical specifications, adapting them as required and building them into their own standards.

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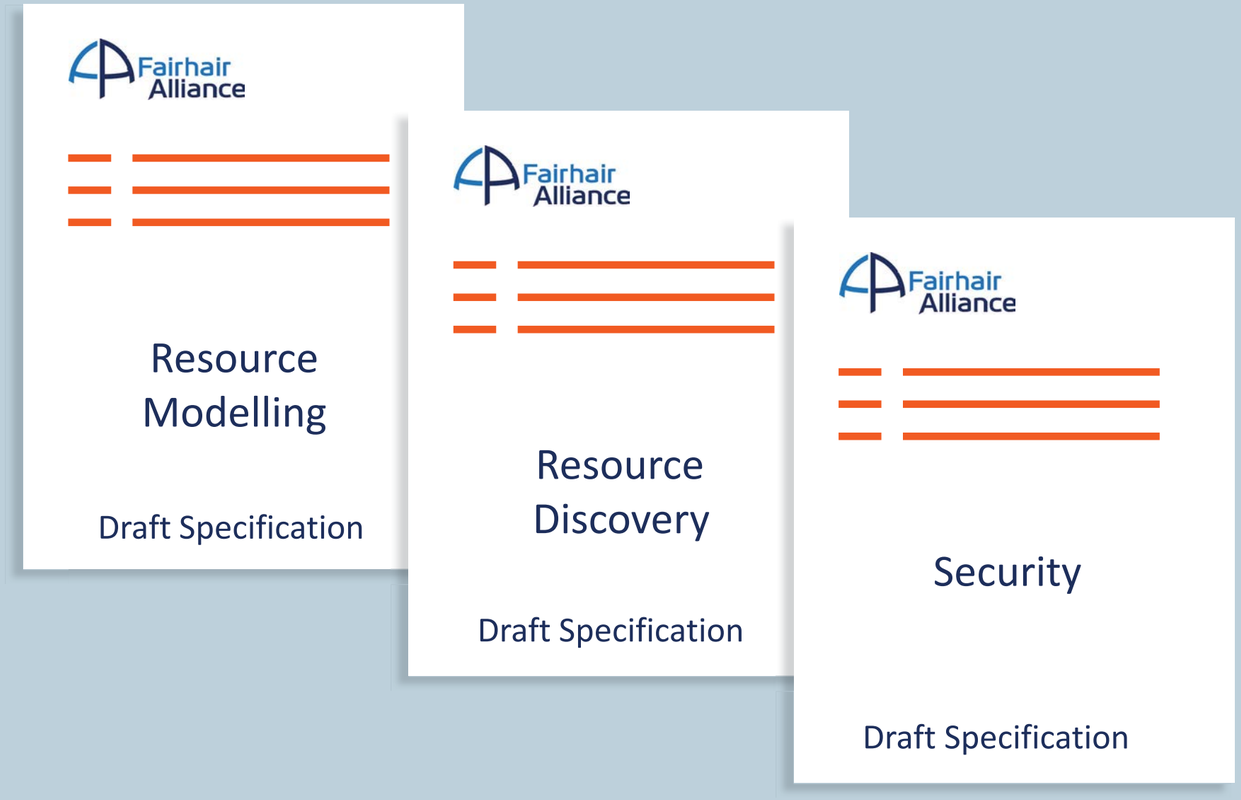
Fairhair specifications and documents



Download now

Our Security White Paper and an overview of our draft specifications are available from the Fairhair website (https://www.fairhair-alliance.org/technology/whitepapers.html).

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Summary

- Defining specifications for a common IP-based infrastructure
- Enabling the IoT for commercial buildings
- Building on established and standardized IT technologies
- Working closely with established ecosystems
- Addressing the security risks inherent to a more open, IP-based environment

Thank you.

→ www.fairhair-alliance.org

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