Introduction to ToIP & Applications in Edge/IoT

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Agenda

- A quick introduction of

  - ToIP Foundation

  - The ToIP Architecture to the Problem of Trust in Internet

  - How to Get Involved

- Open discussion,

  - My personal observations on how all of this can be applicable to edge/IoT

ToIP Foundation

- ## The Trust over IP Foundation

  - ToIP is a JDF member organization under the Linux Foundation

  - ToIP's mission is to to provide a robust, common standard and complete architecture for Internet-scale digital trust. For example:
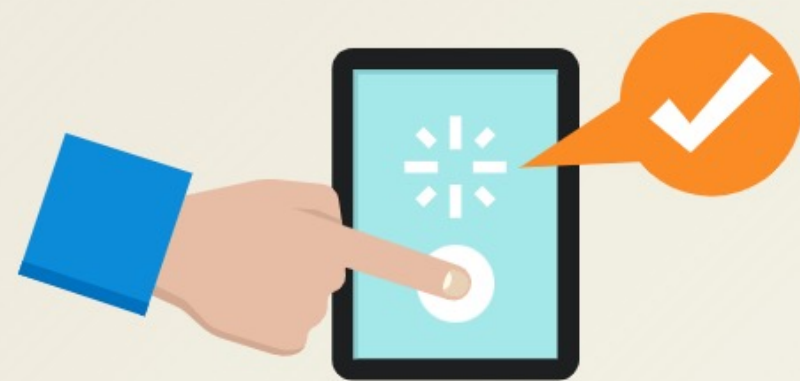
Passwordless authentication and intelligent authorization for faster, easier, and privacy-respecting digital experiences
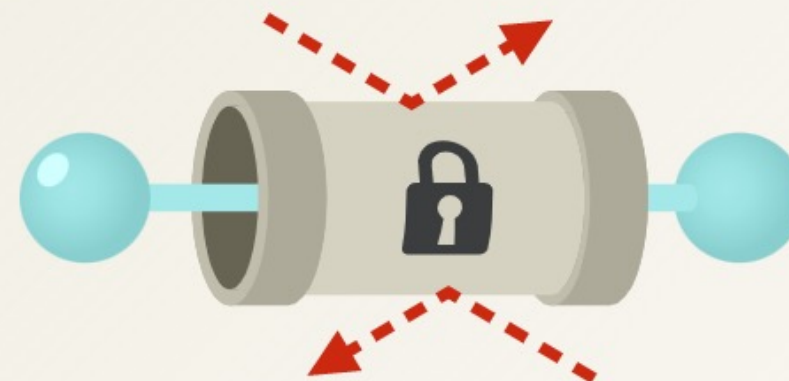
Lifetime private digital connections with customers, suppliers, partners, and regulators, with full audit trails for regulatory compliance

Verifiable Origins for physical and digital goods, with a provable journey through a supply or ownership chain

The Problem of Trust

- The original Internet architecture does not address trust

  - The problems of identity, authenticity, integrity, verifiability etc. are explicitly pushed to the upper layer

  - Over time, Internet based systems commonly adopted :

    - A certificate identifying a service, where the certificate is distributed by a centralized PKI

    - An account with password (user)

    - Or, federation of this general approach

The 3 eras of Internet identity

Centralized	Federated	Decentralized
• X.500	• SAML	• Blockchains
• SSL	• OpenID	• DIDs
• TLS	• OAuth	• Verifiable
• HTTPS	• UMA	Credentials

Thanks to Drummond Reed

The Problem of Trust

- The centralized/federated approach causes many ills in today's Internet

  - Mega platforms, walled gardens

  - Misinformation

  - Mega scale breaches

  - Privacy / data loss in massive scale

  - Supply chain vulnerabilities

  - ...

The Problem of Trust

- Future technology developments demand even stronger sense of trust

  - Large scale edge/IoT/sensors

  - AI/ML based automated decision making, autonomous systems

  - Immersive web XR, metaverses

- We need a better way to manage trust and trust framework

- Trust > Security !

ToIP Architecture

- Design Principles for the ToIP Stack

  - End systems control data and identity

  - Universal connectivity based on a standard messaging layer

  - Decentralization

  - Verifiability

  - Confidentiality

  - Transitive trust

- Four layers, Two stacks...

ToIP Architecture

- [Explore the architecture in graphics](#)

Get Involved

- For more information

  - Web sites with white papers, specs, news etc: https://trustoverip.org/

  - Explore the architecture components: https://trustoverip.org/wp-content/toip-model/

  - Working Groups: https://trustoverip.org/get-involved/working-group-activity/

  - Wiki: https://wiki.trustoverip.org/display/HOME/Trust+Over+IP+Foundation

- Join ToIP community as a contributor, general or steering member

Thanks to Drummond Reed
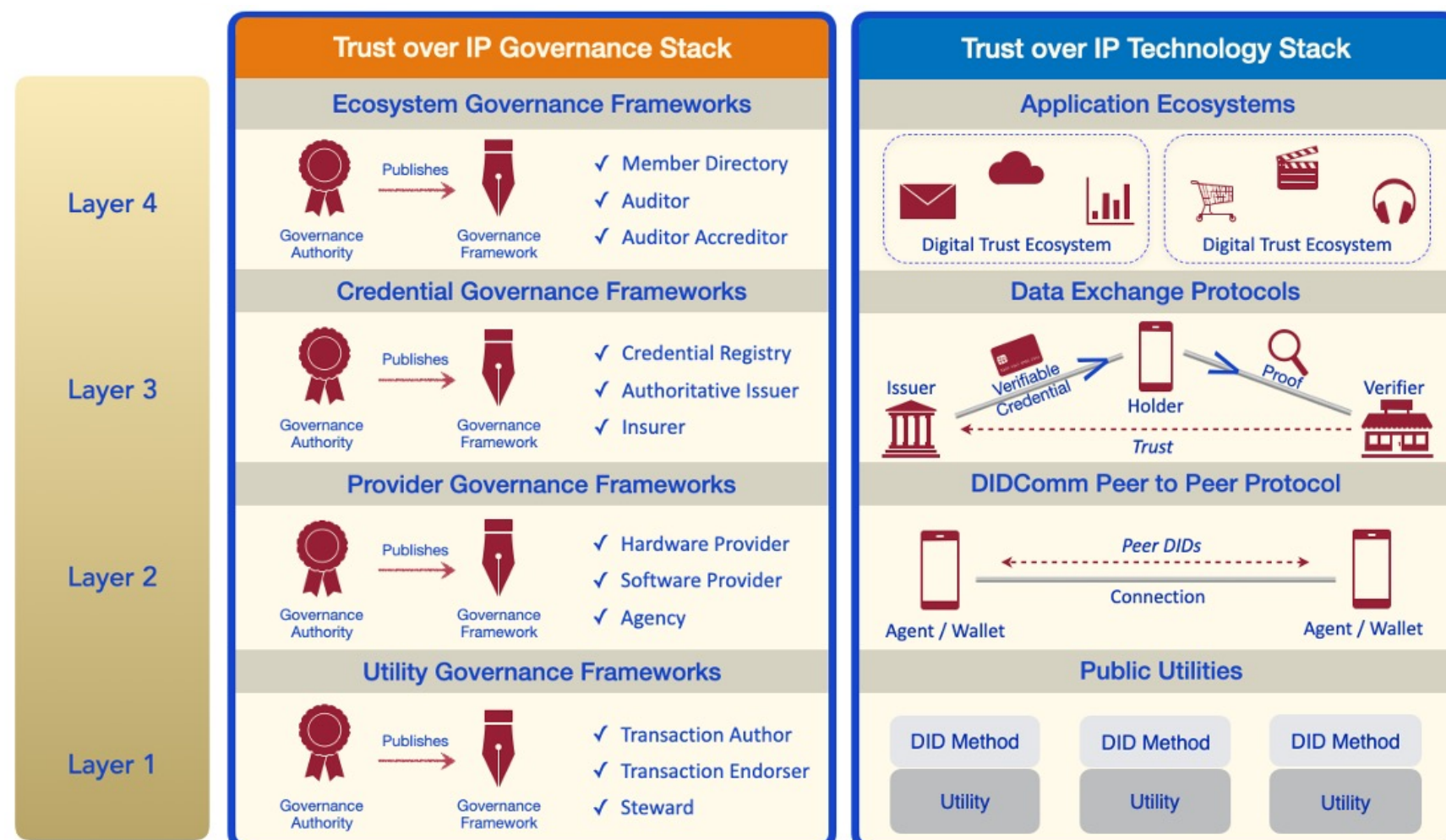
ToIP Working Groups

Governance Stack WG

Technology Stack WG

Utility Foundry WG

Ecosystem Foundry WG

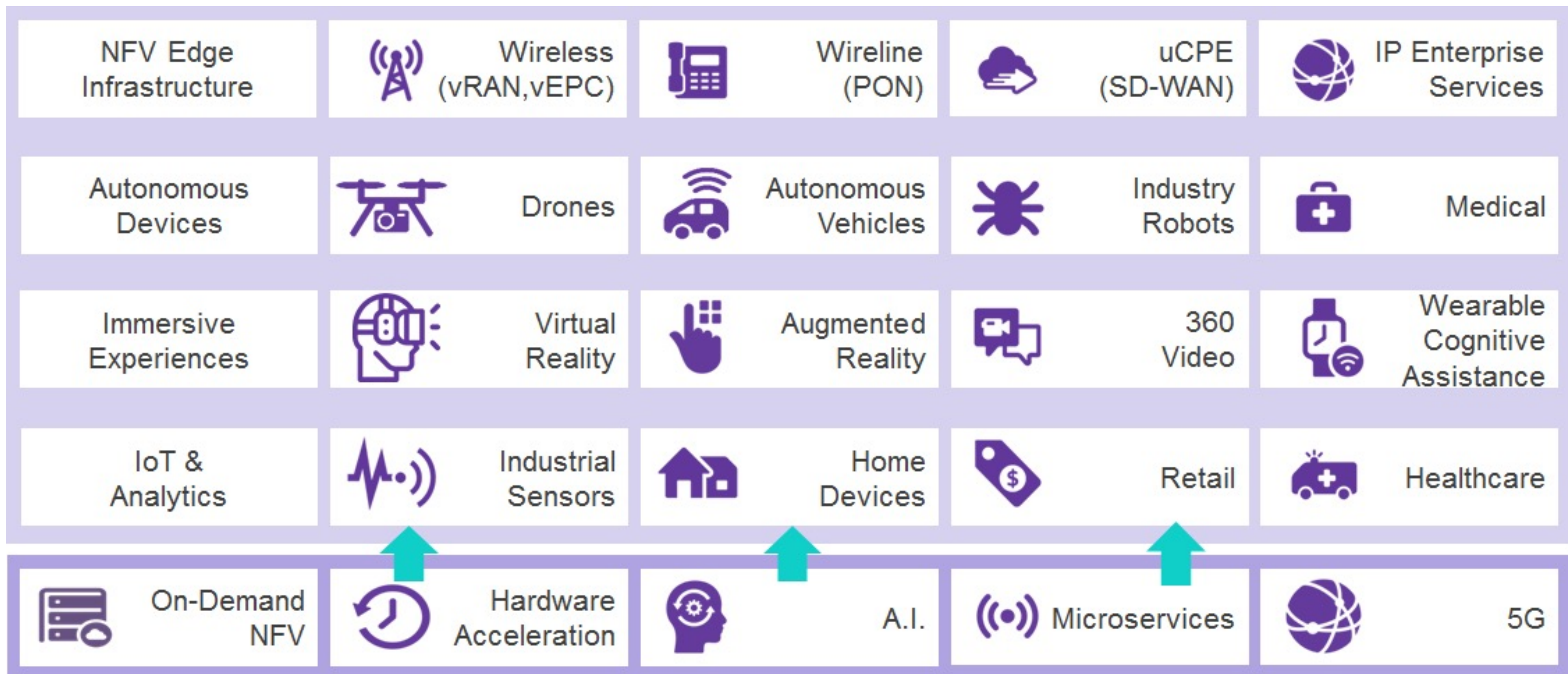Concepts and Terminology WG

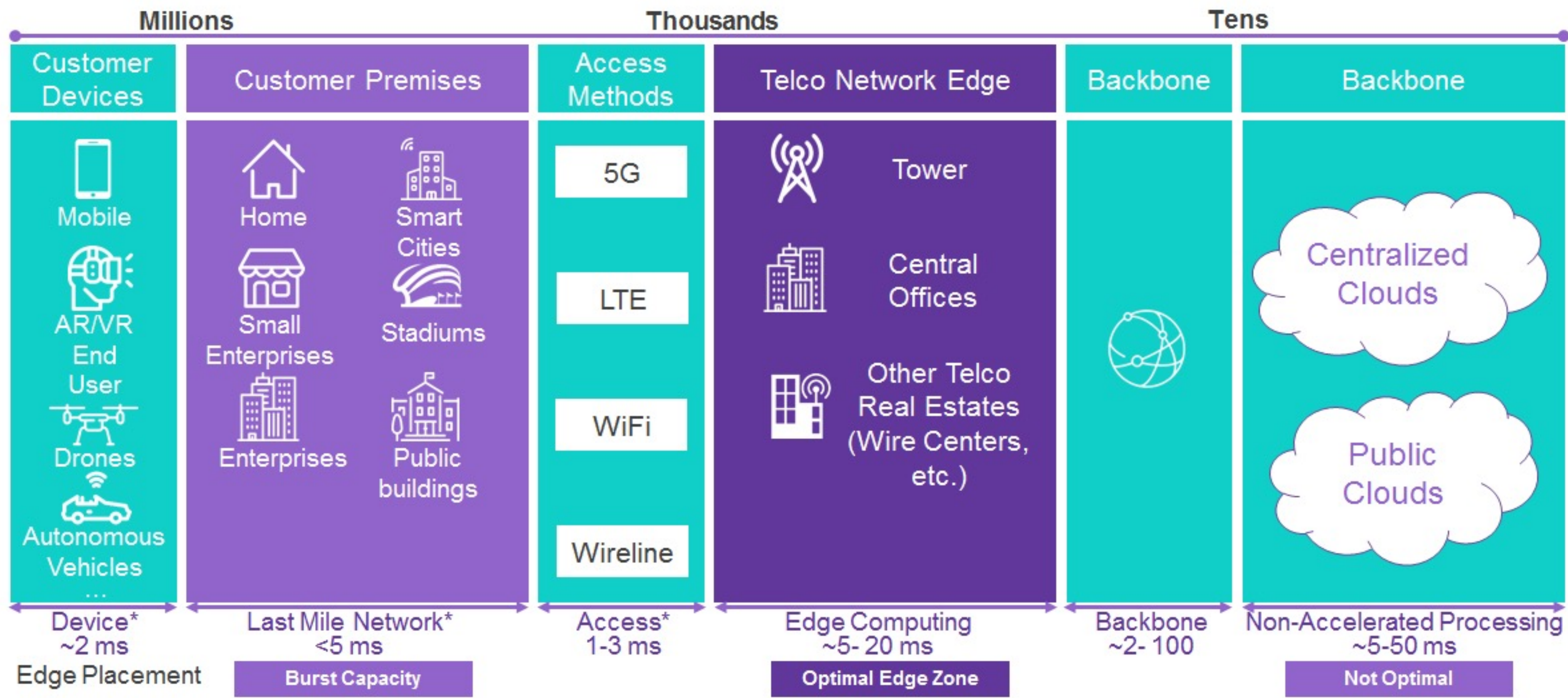Inputs and Semantics WG

Human Experience WG

Good Health Pass WG

Thanks to Drummond Reed

Open Discussion

Applications of decentralized trust in edge/IoT

NFV Edge Infrastructure	Wireless (vRAN,vEPC)	Wireline (PON)	uCPE (SD-WAN)	IP Enterprise Services
Autonomous Devices	Drones	Autonomous Vehicles	Industry Robots	Medical
Immersive Experiences	Virtual Reality	Augmented Reality	360 Video	Wearable Cognitive Assistance
IoT & Analytics	Industrial Sensors	Home Devices	Retail	Healthcare
On-Demand NFV	Hardware Acceleration	A.I.	Microservices	5G

Thanks

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