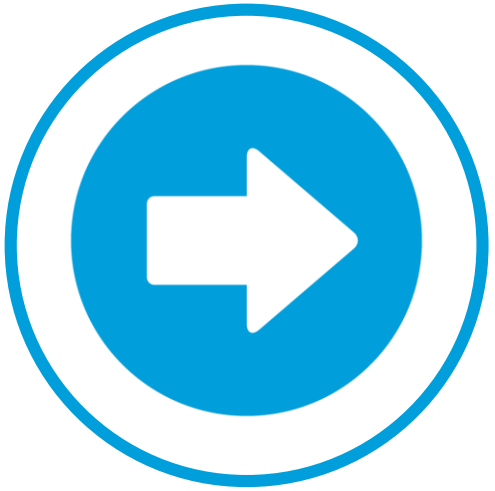
Sorabh Saxena

Senior Vice President
Software Development & Engineering, AT&T

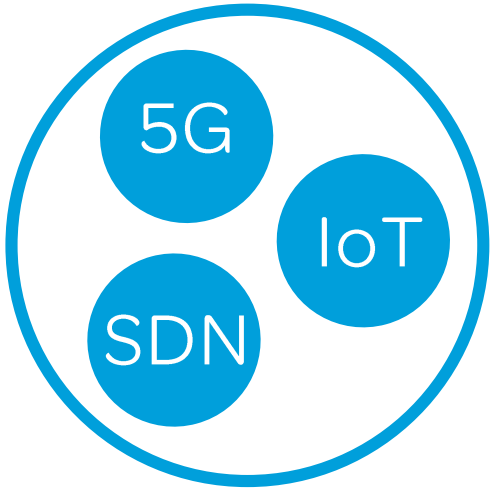
SDN and its Critical Role in Unlocking Social & Economic Potential

Unlocking Potential

Network impact on the economy



AT&T Innovation

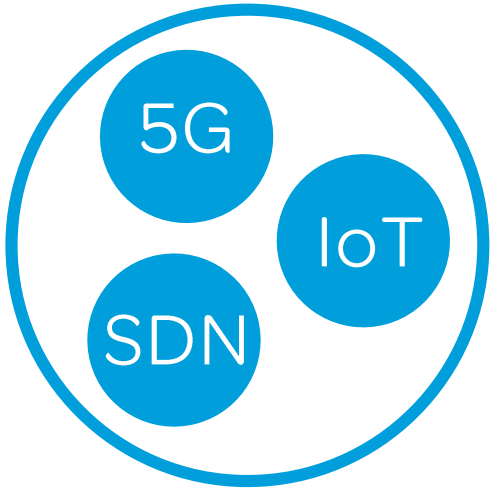


Emerging Technologies

Call to Action

Network impact on the economy

AT&T Innovation



Emerging Technologies

Call to Action

The Railroad & Networking Industry

Growth

- *Rapid business expansion*
- *Surge in trade*
- *Increased competition*

17x

- *Radical globalization & modernization*
- *Increased pace & reach of change*

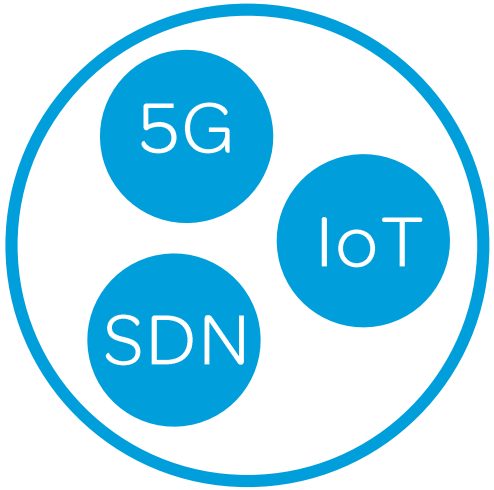
40x

1838 - 1853

1995 - 2010

Network impact on the economy

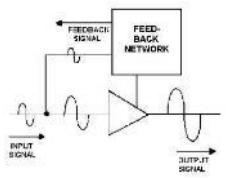
AT&T Innovation



Emerging Technologies

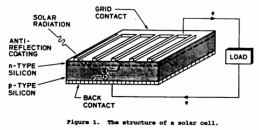
Call to Action

AT&T Labs A History of Innovation



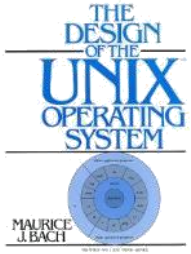
1927
Negative Feedback Amplifier

1947
The Transistor



1954
Solar Cells

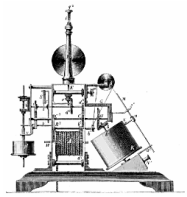
1958
The Laser



1970
UNIX Operating System

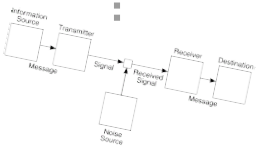
1980
Digital Cellular Phone

1925
Fax Service



1940
Long Distance Computin

1948
The Information Theory



1956
First Transatlantic Cable

1962
Digital Transmission Switching

1976
Fiber Optic Network

2016
ECOMP & AIC

A Successful Formula for Innovation

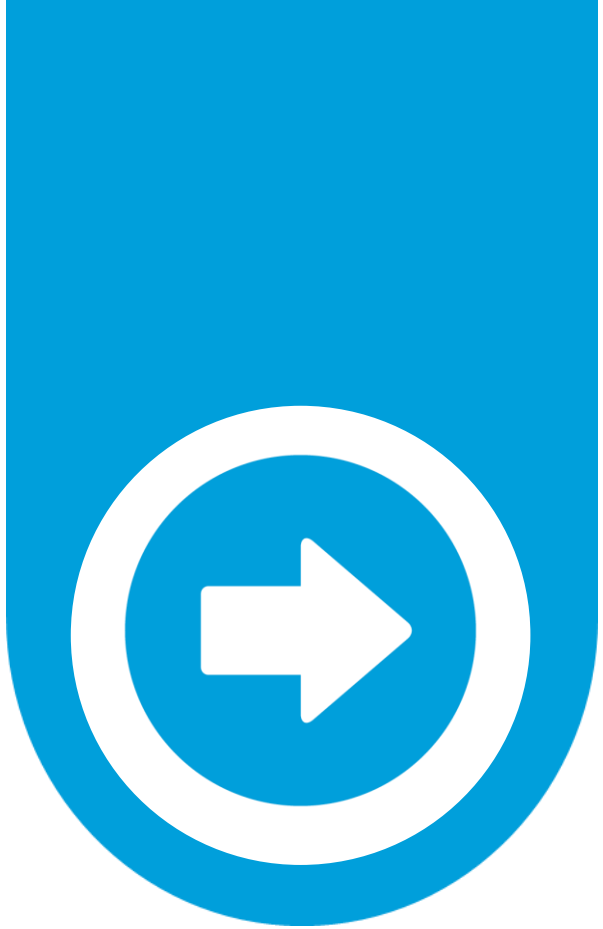
AT&T

- AT&T Labs
- AT&T Foundries
- AT&T Employees

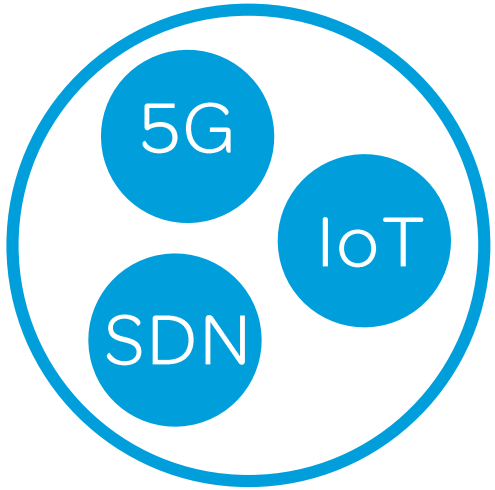
Industry

- Developer Communities
- Industry Leaders
- Academia

Network impact on the economy



AT&T Innovation



Emerging Technologies

Call to Action

IoT

5G

SDN

35B

Things connected to the Internet by 2020

4x

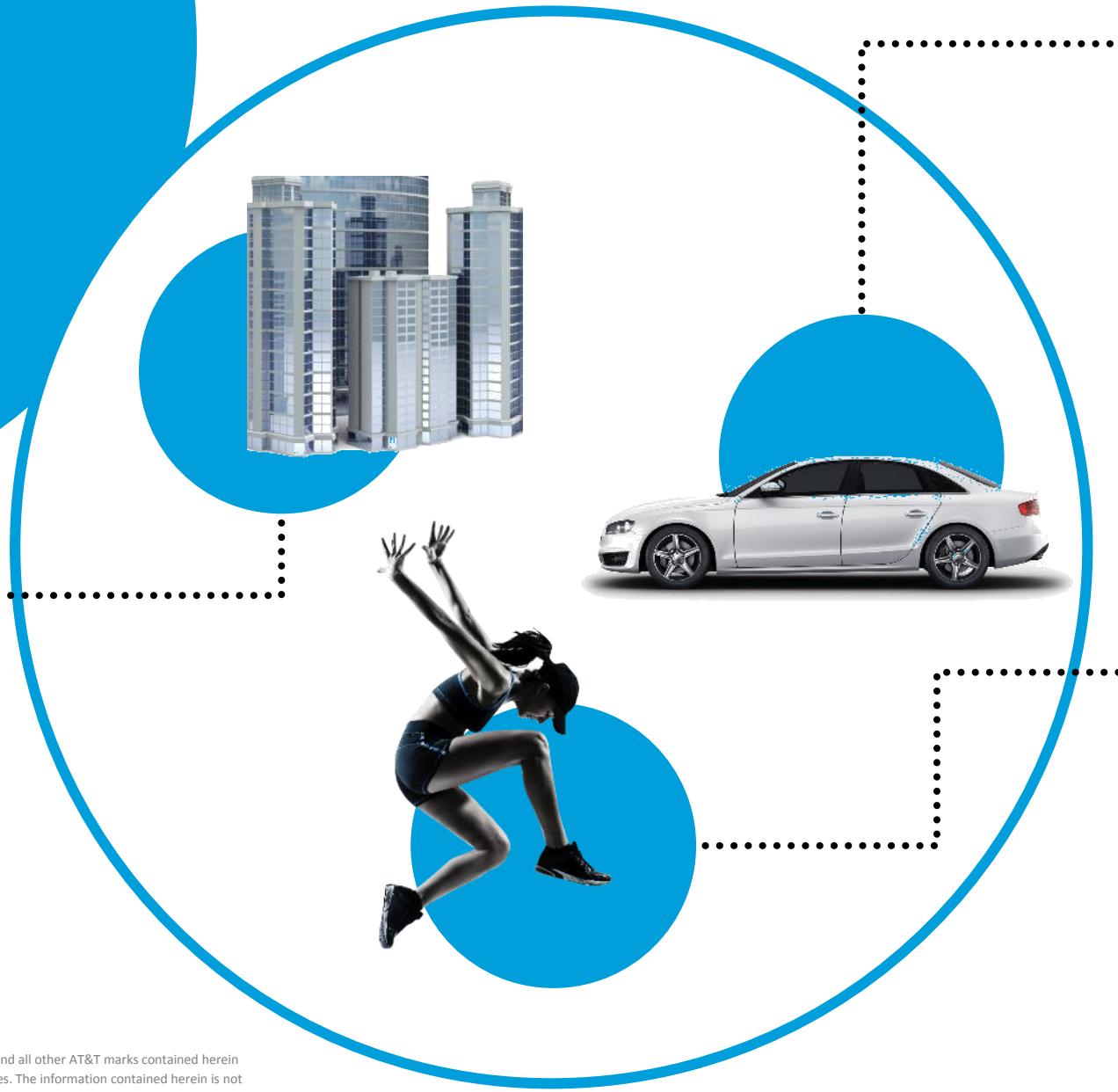
Devices than the world's population

$1 Trillion

Anticipated value of IoT in only a few short years

IoT

Changing Lives



Connected Cars

Health Monitoring

Business Transformation

Solutions

Connected Cars

Connected Home

Smart Cities

Platforms

Security

Device Mgmt

M2X & Flowdesigner

Multi-Network Connectivity

Network

Speed

Reliability

Devices

Gateways

Agents

Things

API Frameworks

Interoperability Standardization

- Adaptive configuration design
- Harmonized standards & protocols
- Optimized bandwidth consumption

Secure Software Management

- Resilient architecture
- Flawed design protection
- Scaled management

Improved Sensor Technology

- Secure environment integration
- Embedded microservice capability
- Power consumption

IoT

5G

SDN

10-100x

Faster expected 5G network speeds than 4G LTE

1-5 ms

Expected 5G latency range

2018

Expected first phase of standard setting

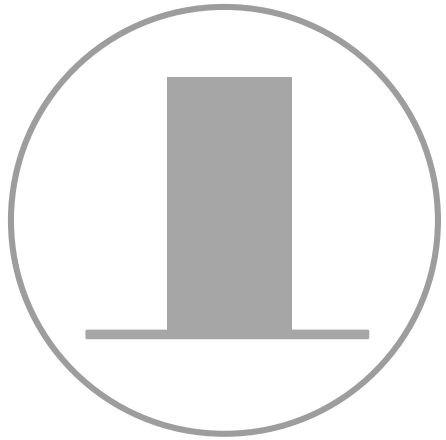
5G deployments subject to change

4G

High Speed Mobile Broadband

100 – 150 Mbps

2 – 8 GHz Frequency Band

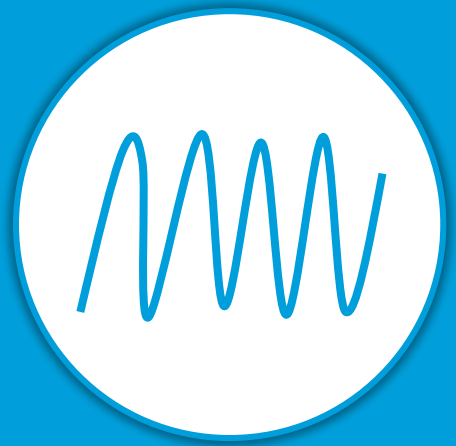


~50 ms Latency

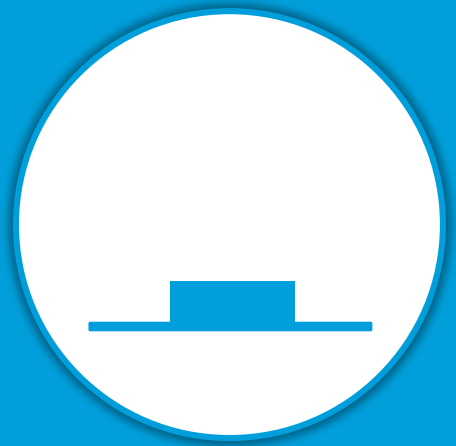
5G

Massive broadband & Massive IoT

1+ Gbps



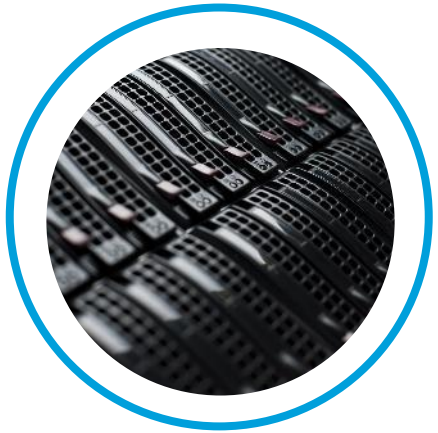
3 – 300 GHz Frequency Band



~1-5 ms Latency

AT&T 5G Approach

Tangible 5G Progress



Unique 5G Technology

Connected Experience

Operating Ecosystem

Timeline

2016 5G Lab Trials

2017 Layers 1&2 spec alignment

2018 Early market deployment

5G deployments subject to change

3

System of System Architecture

- Dynamic handling of various use cases
- Seamless integration of multiple technologies and standards
- Reliable & highly secure service

2

High Abstraction Capability

- Network slicing
- Tailored virtual instances
- Improved control capability

1

Integrated Circuit Technologies

- Enhanced distance
- Improved penetration
- Multi-connectivity

IoT 5G SDN

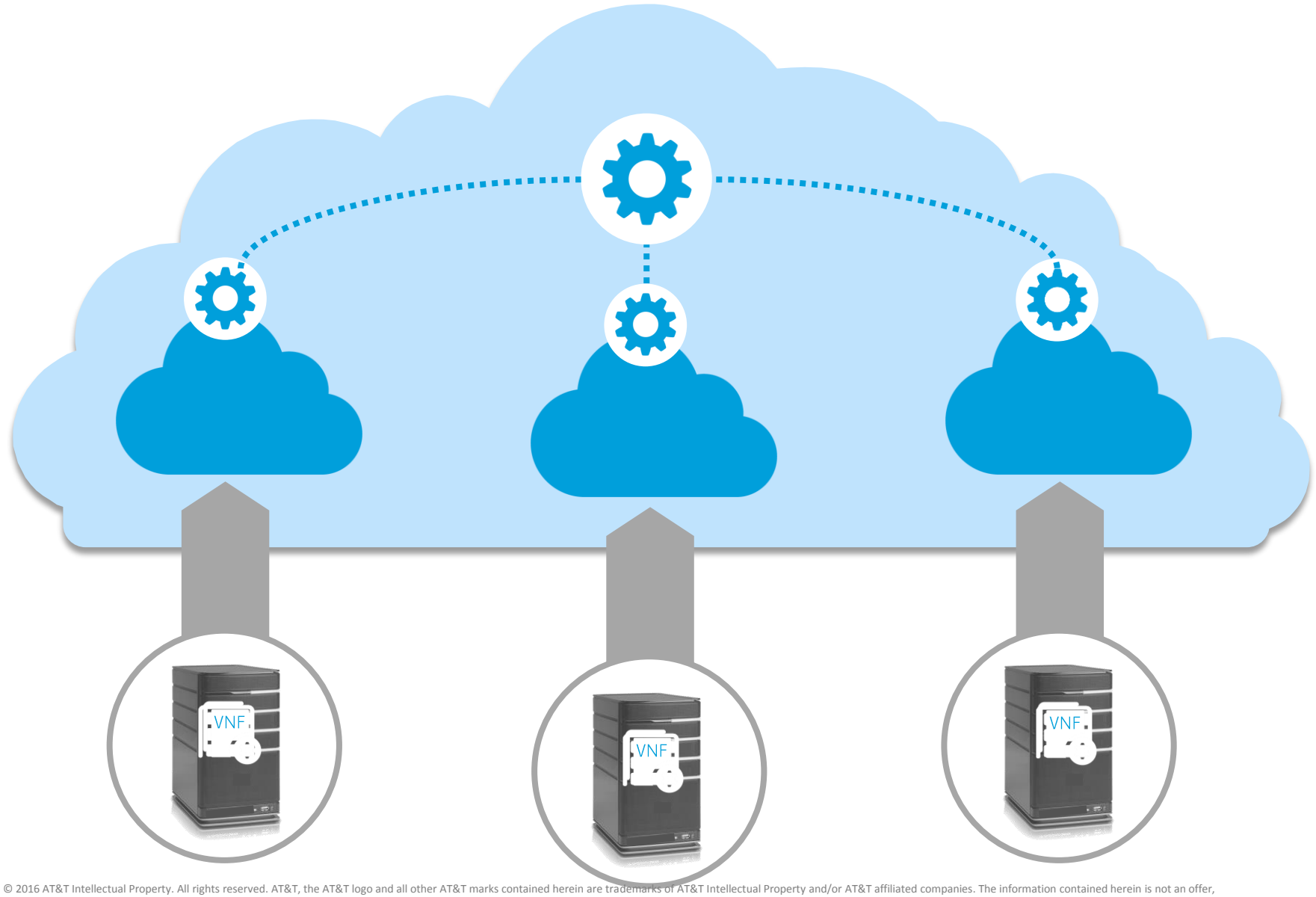
10x

Expected total network traffic growth between now & 2020

115 PB

Data traversing AT&T's network daily

AT&T SDN Approach

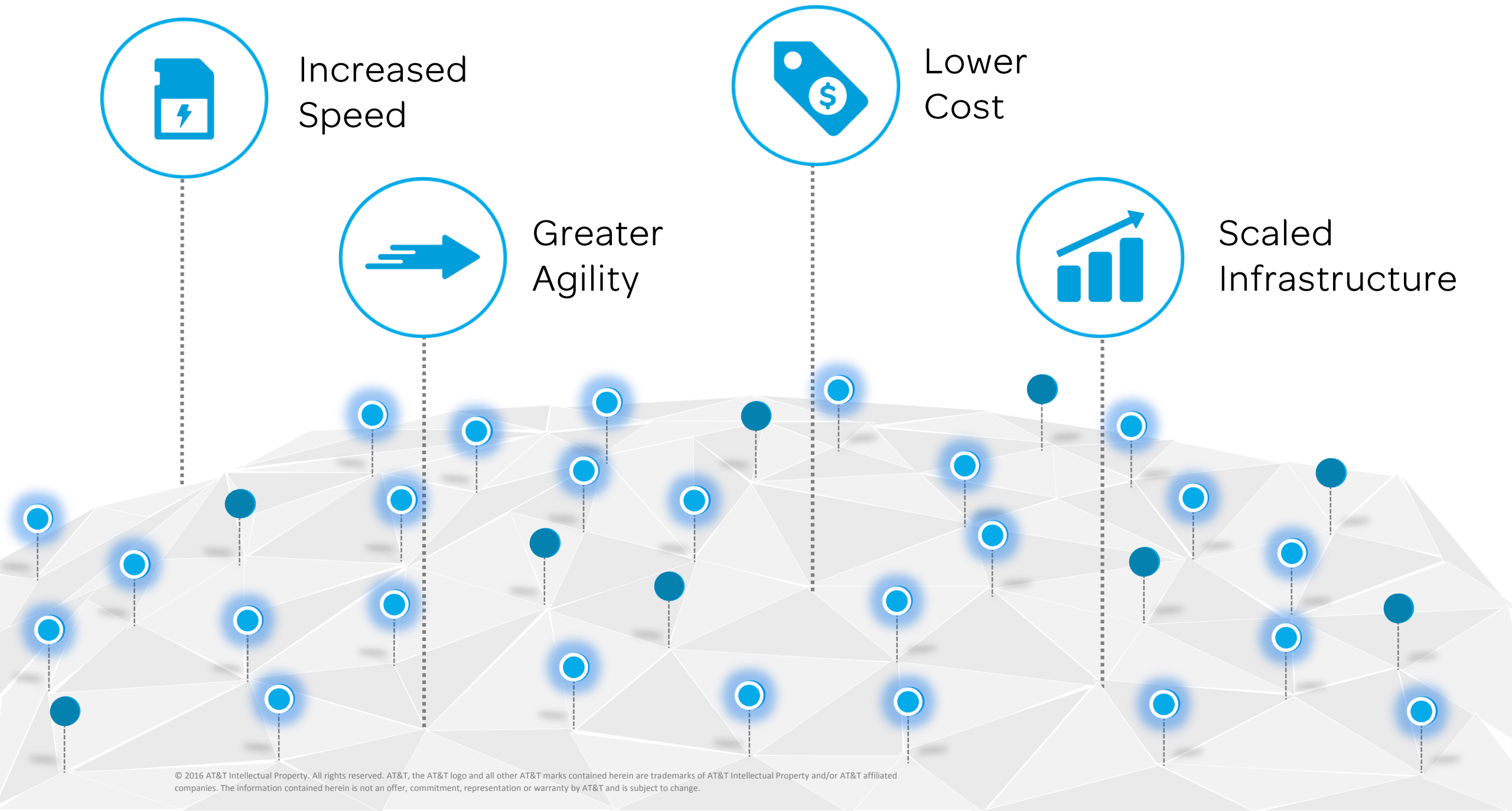


Global & Local Software Controllers

Virtual Network Functions

Cloud Controlled & Orchestrated

White Box Commodity Hardware



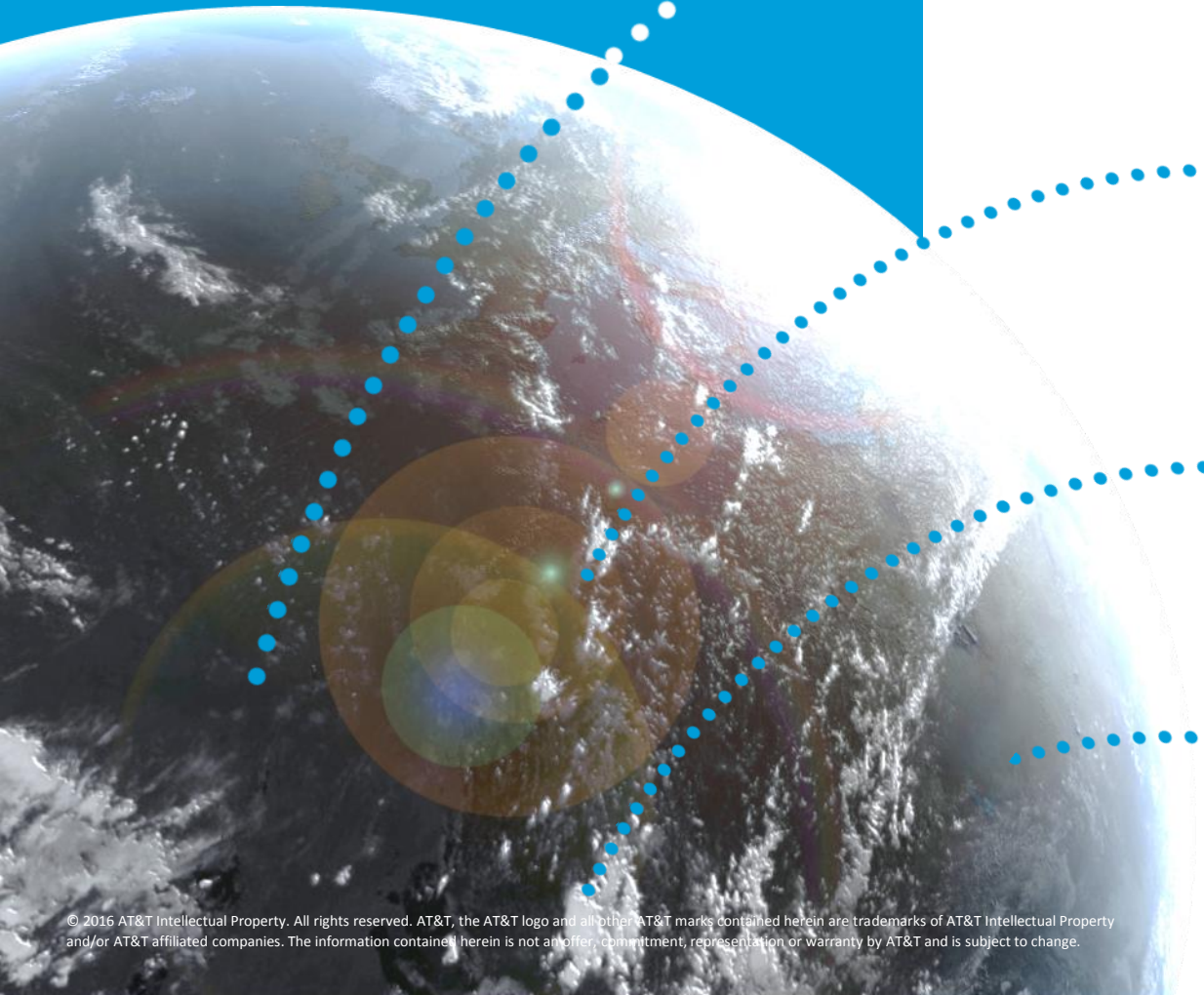
AIC: The AT&T Integrated Cloud

Globally Distributed

Integrated Codebase

Built on OpenStack

Open Source Software

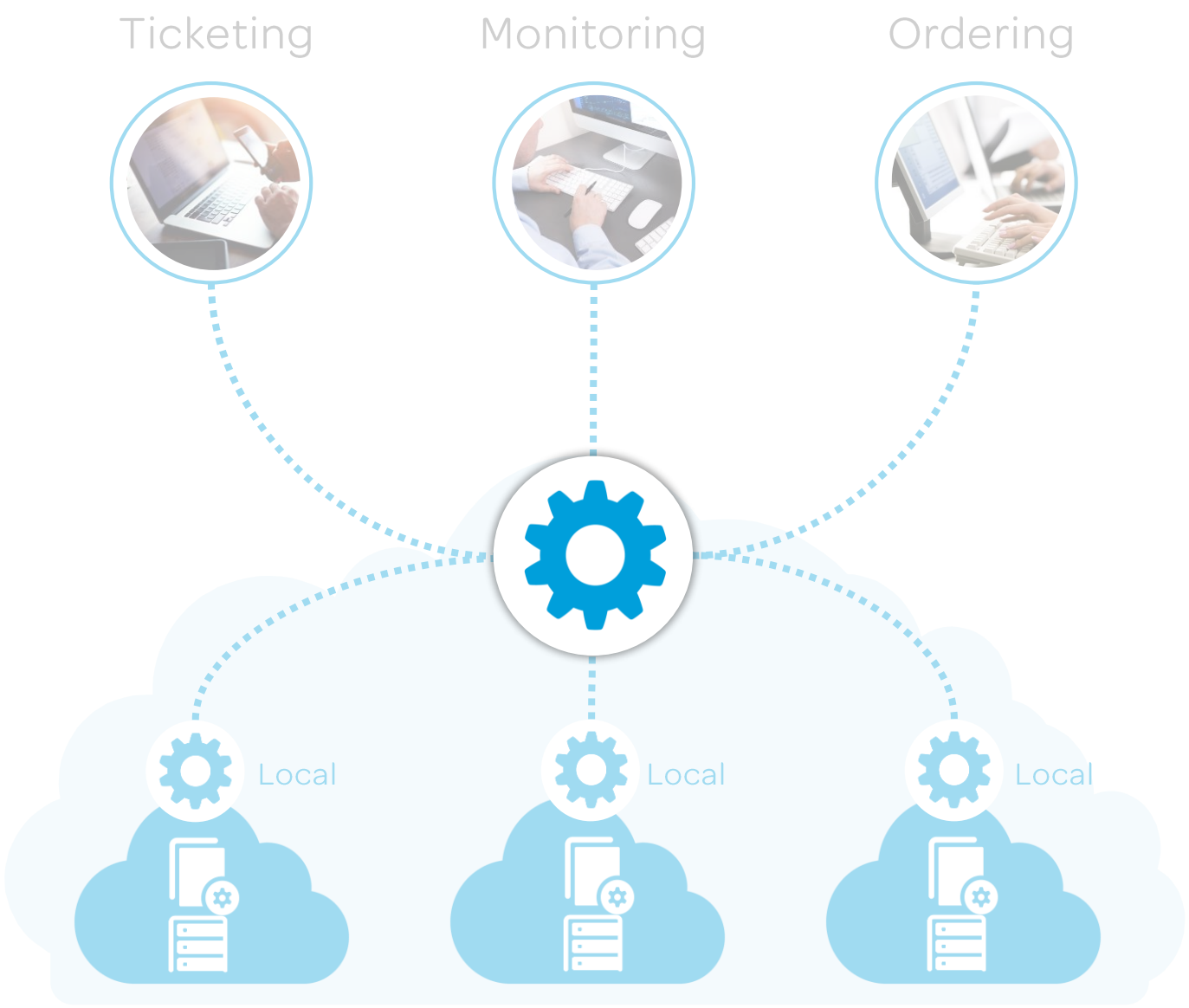


Vibrant Community

Source Code Accessible

Speed & Agility

Open Innovation



E *nhanced*

C *ontrol*

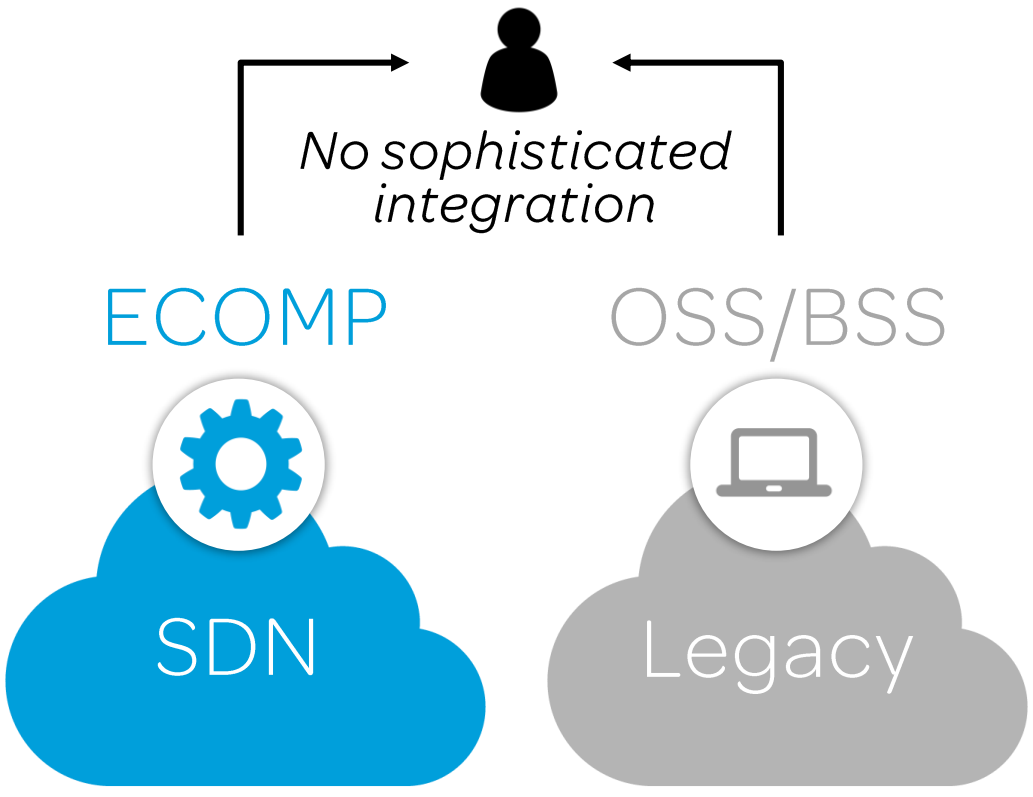
O *rchestration*

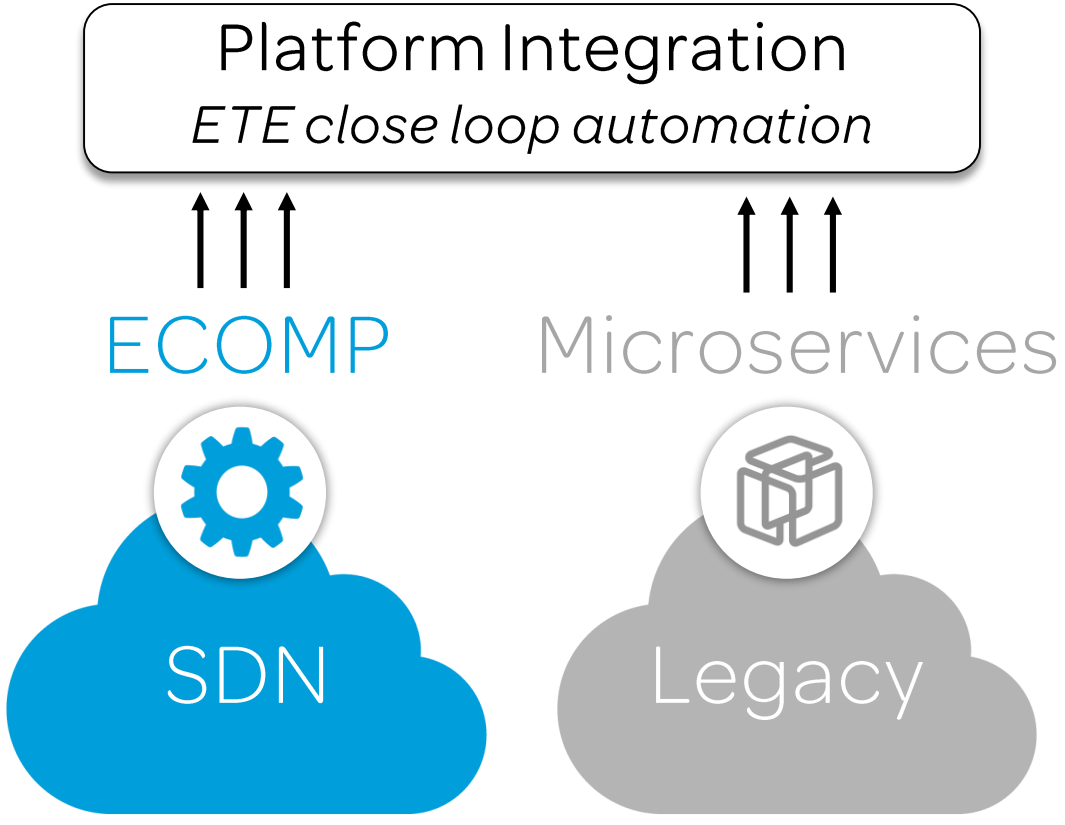
M *anagement*

P *olicy*

Architectural Integration

Past





3 Service Design & Creation

- Robust E2E service composer & activation
- End-to-end service quality of experience

2 SDN & Control

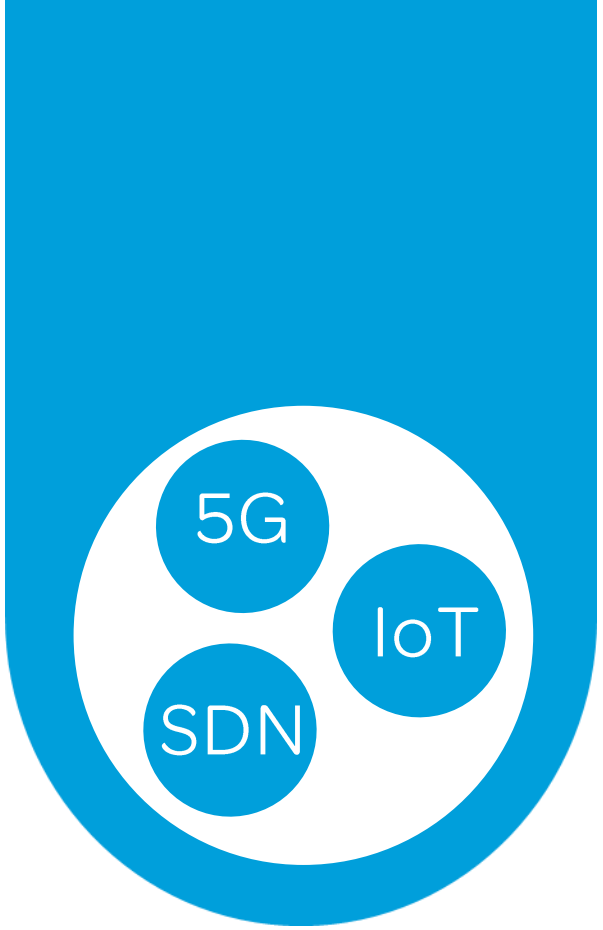
- Virtualization with scale & speed
- Dynamic management framework
- Open framework to enable modular plug-in

1 Design Compatibility

- Simpler, faster, cheaper hardware
- Northbound compatibility
- Reliability

Network impact on the economy

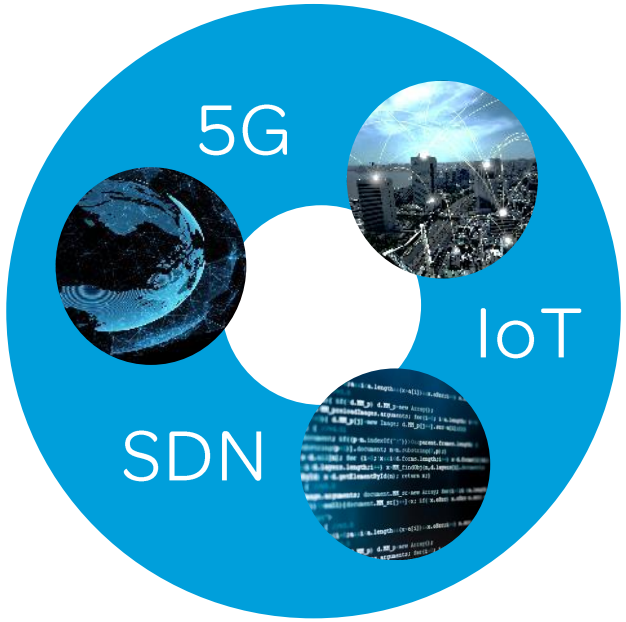
AT&T Innovation



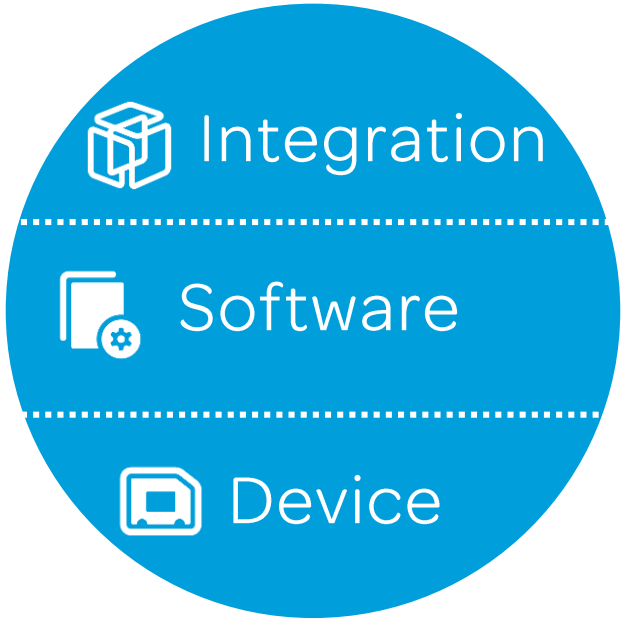
Emerging Technologies

Call to Action

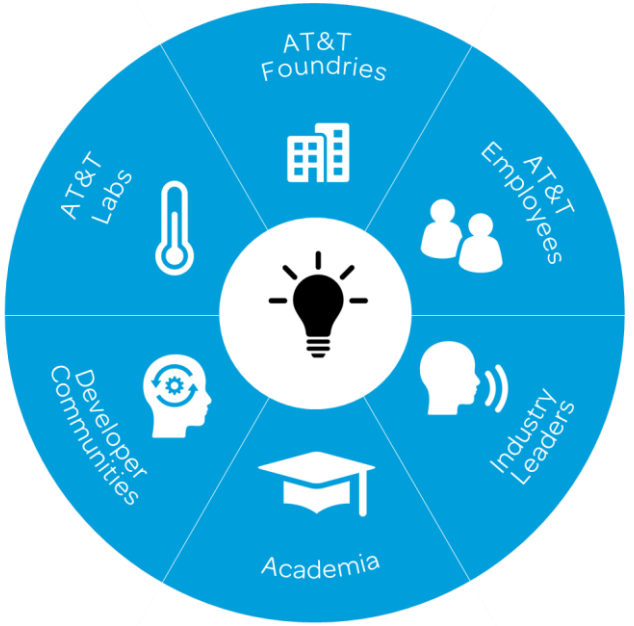
Join the many technology areas…



Determine the level of impact…



Collaborate with industry leaders…



Unlock Socio & Economic Potential