



INTELLIGENT EDGES & HOW TO BENEFIT FROM SDN/NFV.

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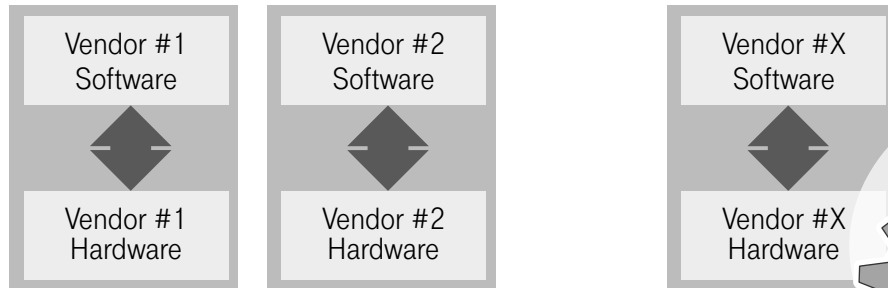
ERLEBEN, WAS VERBINDET.

Basics of a programmable ICT infrastructure

(NOT SO NEW) TRENDS IN THE MARKET.

SDN

TO OPEN VENDOR ECOSYSTEM LOCK-IN



- New product with modification of platform only
- Software implementation by vendor only

NFV

TO LOWER HIGH PLATFORM COMPLEXITY



➤ **LIMITED FLEXIBILITY, SLOW IMPLEMENTATION, EXTENDED TIME-TO-MARKET**

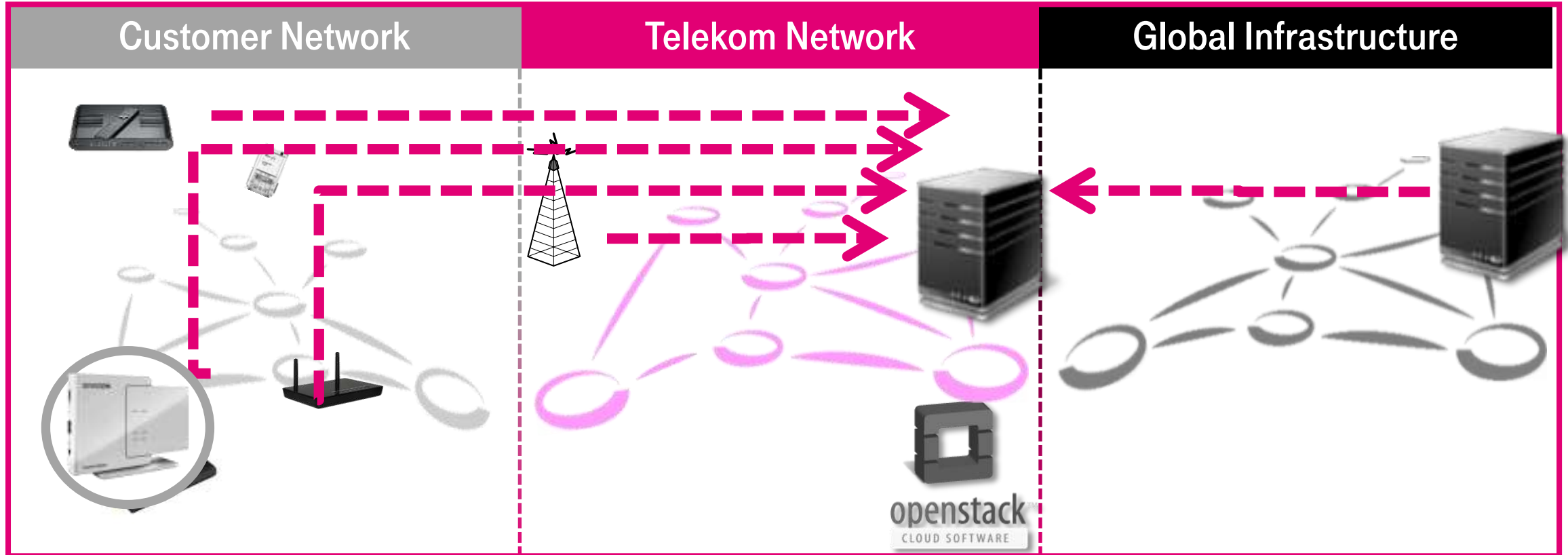
ORDER OF MAGNITUDE IMPROVEMENTS ARE NEEDED.



JUNIPER
NETWORKS

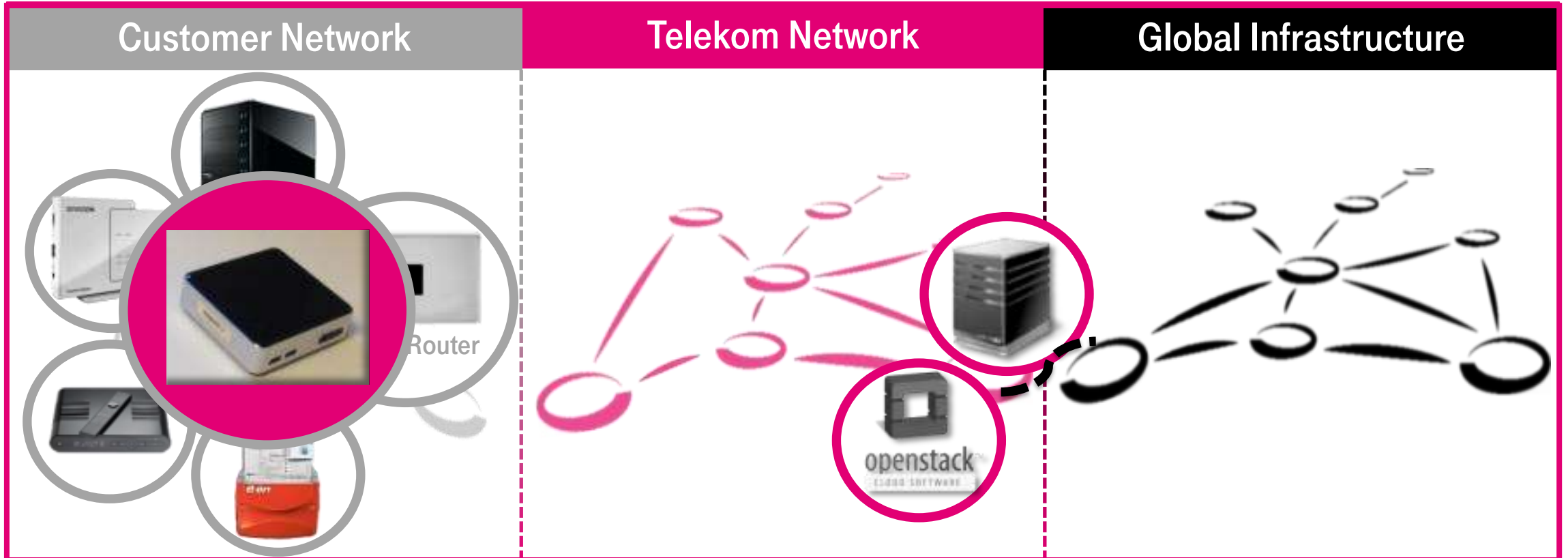
CLOUD NETWORK CENTRIC SERVICES.

TWO DIFFERENT DIRECTIONS OF FUNCTIONAL MOVEMENT.



EXTENDED APPROACH UTILIZING GATEWAYS & CLOUD.

FLEXIBLE PROVISIONING OF ENTERPRISE & HOME NETWORK SERVICES.



Examples of new options in access & home networks

ADVANCED ACCESS BUNDLING : DSL COMMUNITY.

MORE BANDWIDTH, BETTER QUALITY, HIGHER FLEXIBILITY.



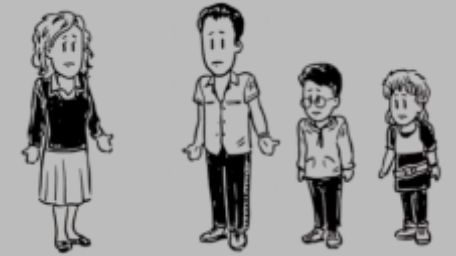
DSL Community
DSL + DSL Neighbor

DSL COMMUNITY.

ACHIEVING MORE TOGETHER.



**Bottlenecks by
simultaneous usage**



**No bottlenecks by utilize
unused band width**



DSL COMMUNITY.

PROTOTYPE IMPLEMENTATION.

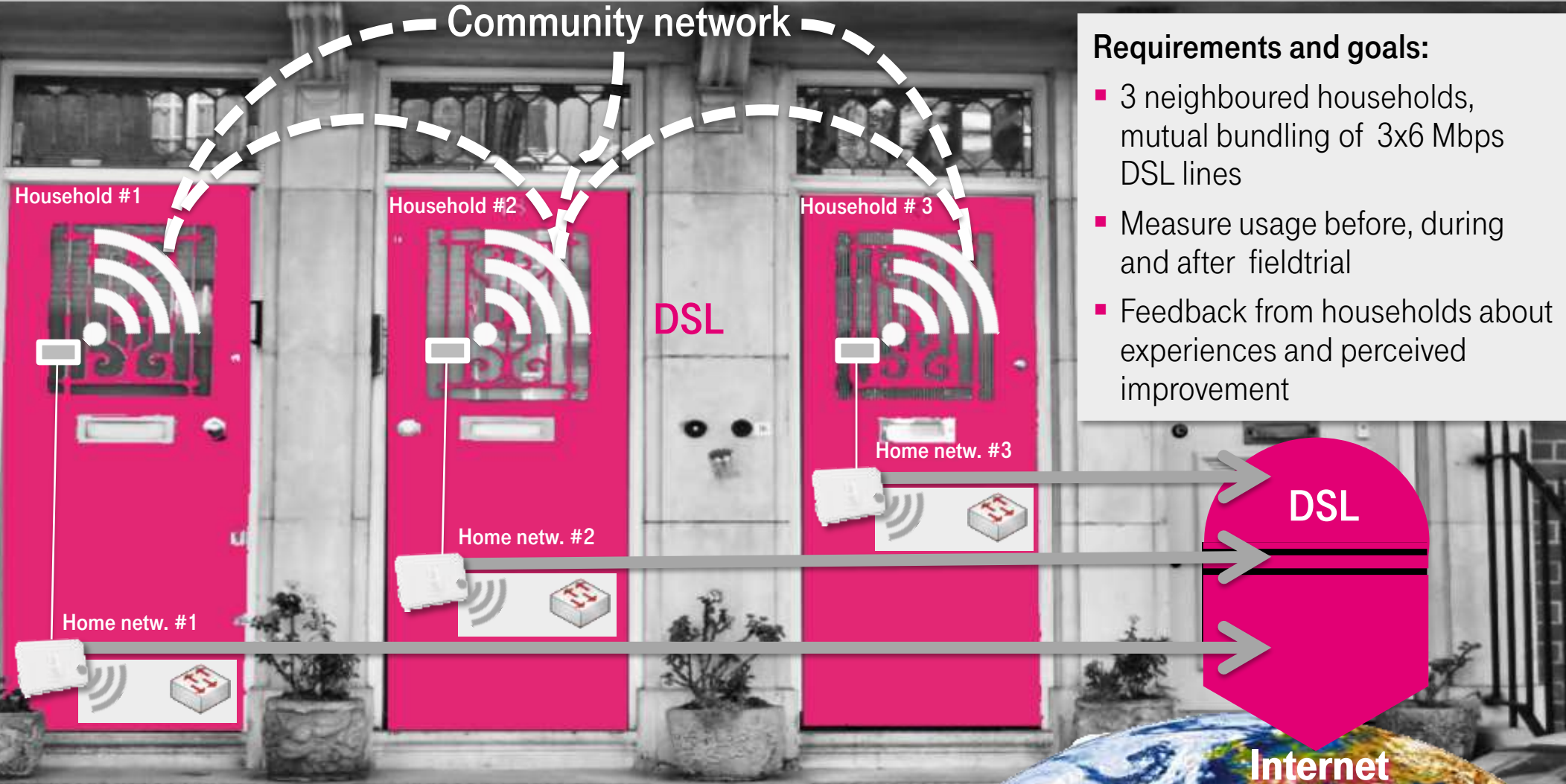


- 1 Own DSL Access
- 2 Own DSL Access + Neighbour-DSL
- 3 Own DSL Access + Neighbours DSL + Neighbours DSL

Improved Bandwidth – better customer experience and service differentiation.

DSL COMMUNITY.

SMALL FIELDTRIAL IN BERLIN.



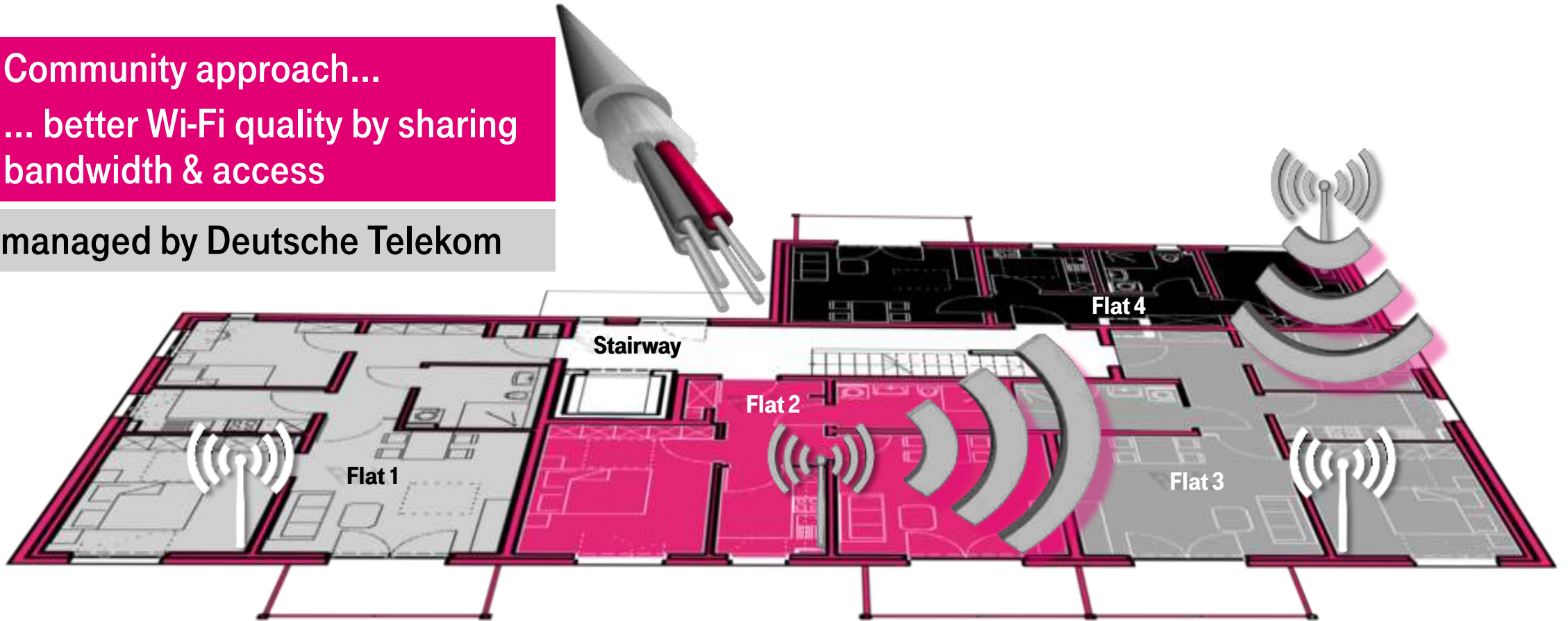
MANAGED WI-FI FOR RESIDENTIAL CUSTOMERS.

A PROMISING APPROACH FOR HOUSING SOCIETY AND MORE!

Community approach...

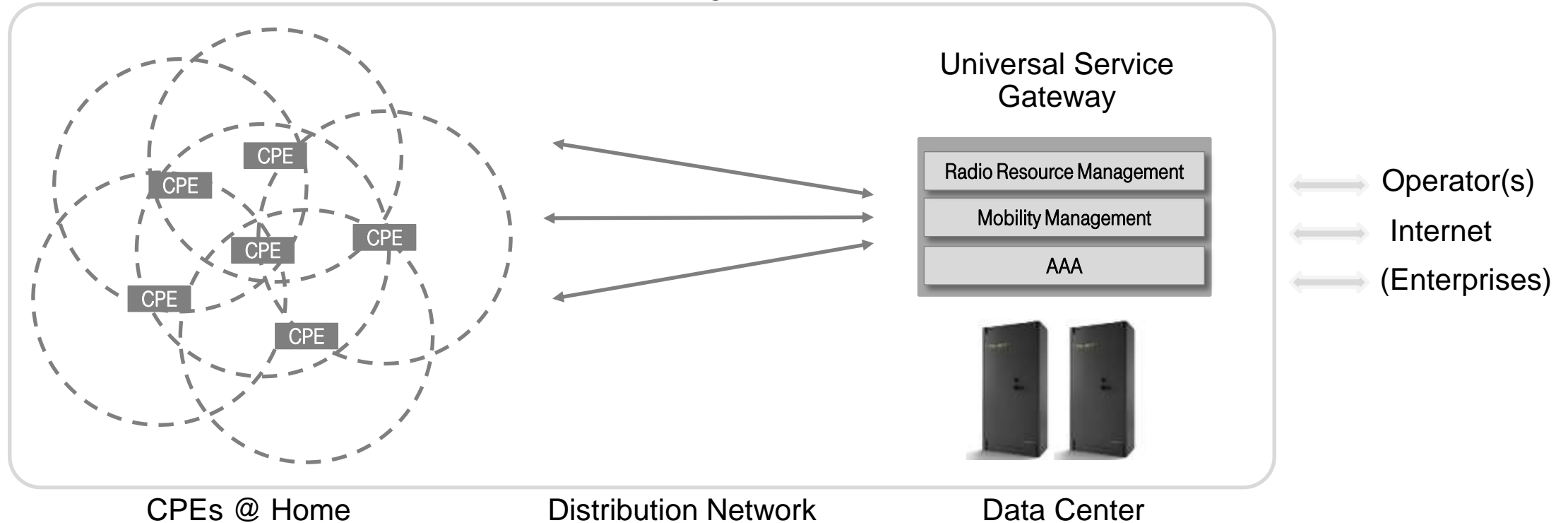
... better Wi-Fi quality by sharing
bandwidth & access

managed by Deutsche Telekom



MANAGED WI-FI FOR RESIDENTIAL CUSTOMERS.

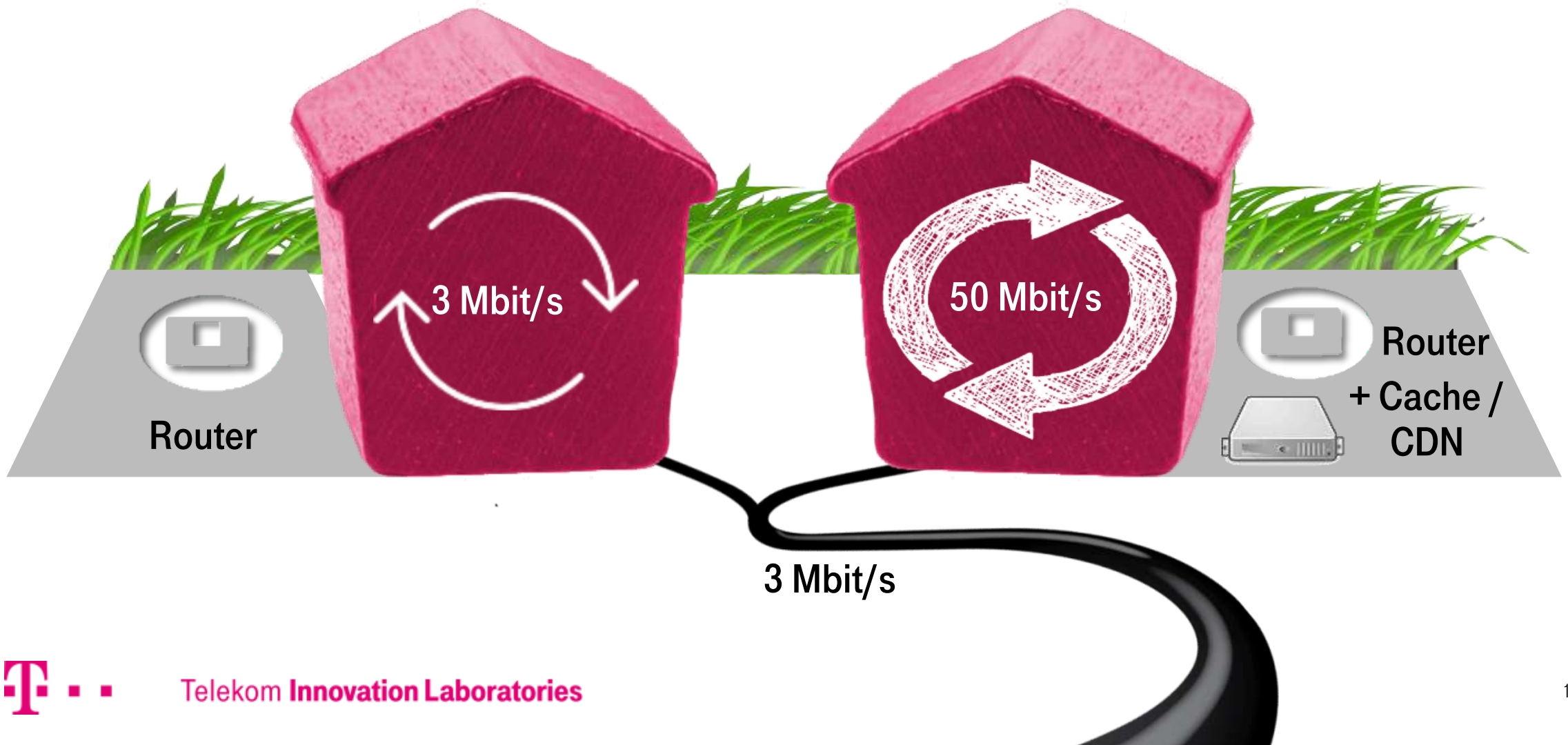
Virtualized AP with radio resource management



CPE → pico cloud for dynamic deployment of Virtual Network Functions; here: Wireless Termination Point

WHAT ELSE COULD WE DO WITH INTELLIGENT GATEWAYS ?

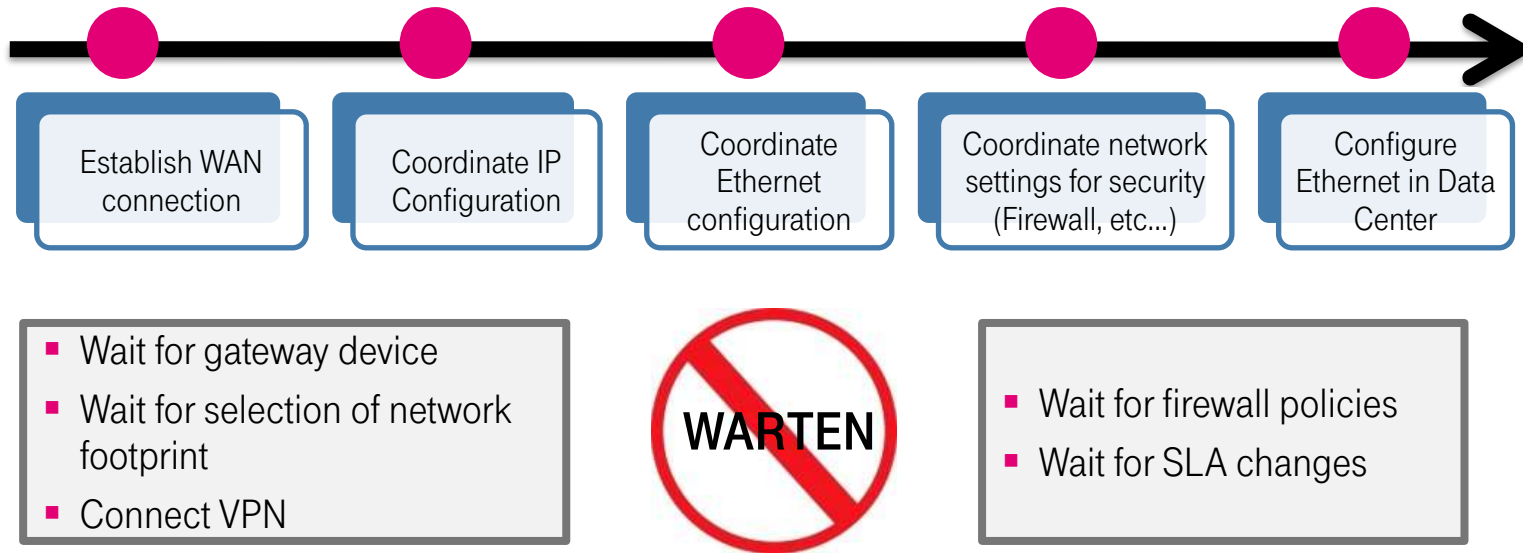
CONTENT ACCELERATION: FEELS LIKE MORE.



**Important additional aspect:
Self service provisioning of enterprise-
and residential-networks**

VPN TODAY:

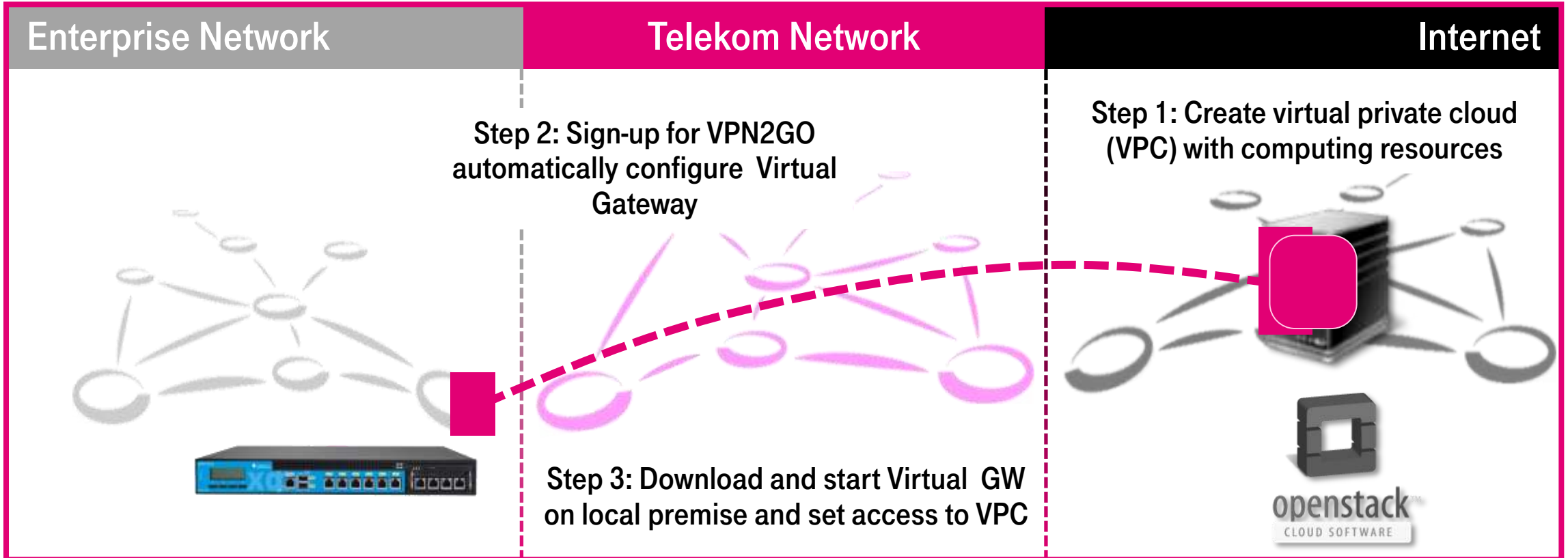
CUSTOMERS WAIT FOR MULTITUDE OF COMPONENTS AND CONFIGURATIONS.



Business potential	How?
Reduced time to revenue	Speed up of WAN service provisioning
New revenue	Through new business models centered around on-demand usage
SLA compliance	Ensure that DT is not penalized for SLA violation during faults
OpEx saving	Automated operations, easier upgraded and better management of resources

CONNECTIVITY SERVICE VPN2GO.

WORKFLOW AUTOMATION THROUGH SDN/NFV.



IS SDN / NFV A REAL GAME CHANGER ?

PROOF BY “RADICAL OPEN SOURCE” APPROACH.

Promises of SDN / NFV

- Breaks vertical lock of HW and SW
- Is modular
- Uses massively open source software
- Reduces complexity for implementation
- Decouple innovation cycles for network equipment and control software
- Lower the market entry barrier for SME

**Flexibility and faster time
to market**



How far can we go ?

- Prototype implementation of SDN-based VPN Setup to the cloud.
- Resources
 - Open Source
 - T-Labs North America
 - SME

It works !

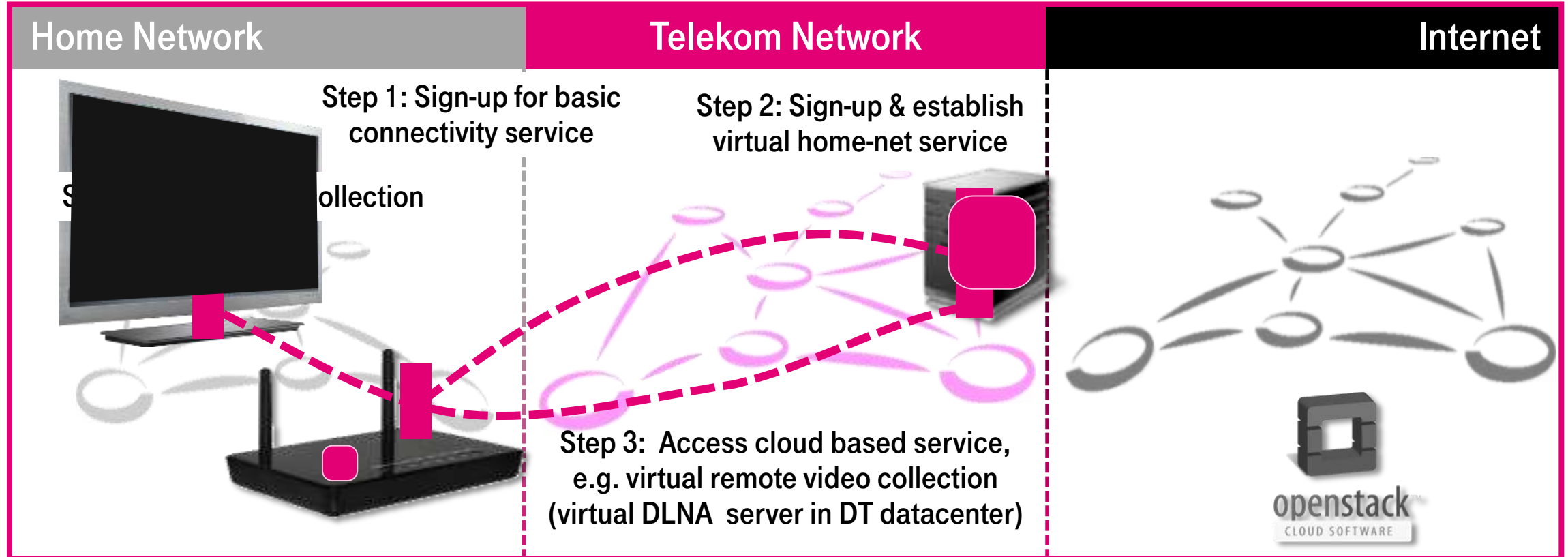
UNIVERSAL HARDWARE.

EXAMPLE OF ENTERPRISE GATEWAY: X86 + PROGRAMMABLE ETHER CHIPSET.



YOUR HOME NETWORK IN YOUR POCKET.

WORKFLOW AUTOMATION THROUGH SDN/NFV.



YOUR HOME NETWORK IN YOUR POCKET.

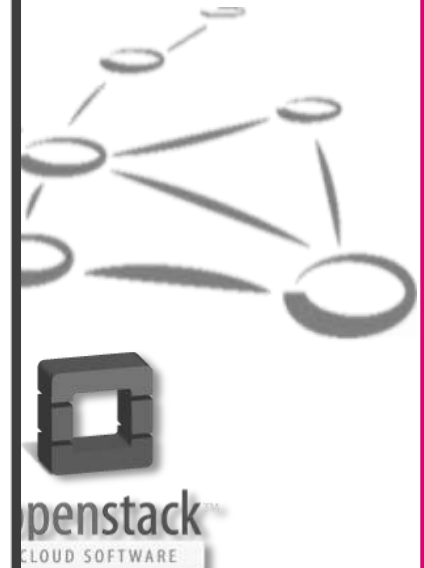
WORKFLOW AUTOMATION THROUGH CLOUD



Home Network




Internet

2:nnnnn





Your Home Network

Marie Müller







Instant Activation

One-Touch Operation

Remote Access

Help & Services

The following services can be activated immediately:

<div>Flat rate plain Internet connectivity Status: activated</div> <div></div> <div>Deactivate</div>	<div>Virtual Home Network (VHN) Status: active</div> <div></div> <div>Deactivate</div>	<div>DSL Community Status: not activated</div> <div></div> <div>Activate</div>
<div>Guest Telekom WiFi Hotspot Status: not activated</div> <div></div> <div>Activate</div>	<div>Telekom Cloud Services (TCS) Status: not activated</div> <div></div> <div>Not available</div>	<div>Entertain Status: not activated</div> <div></div> <div>Not available</div>



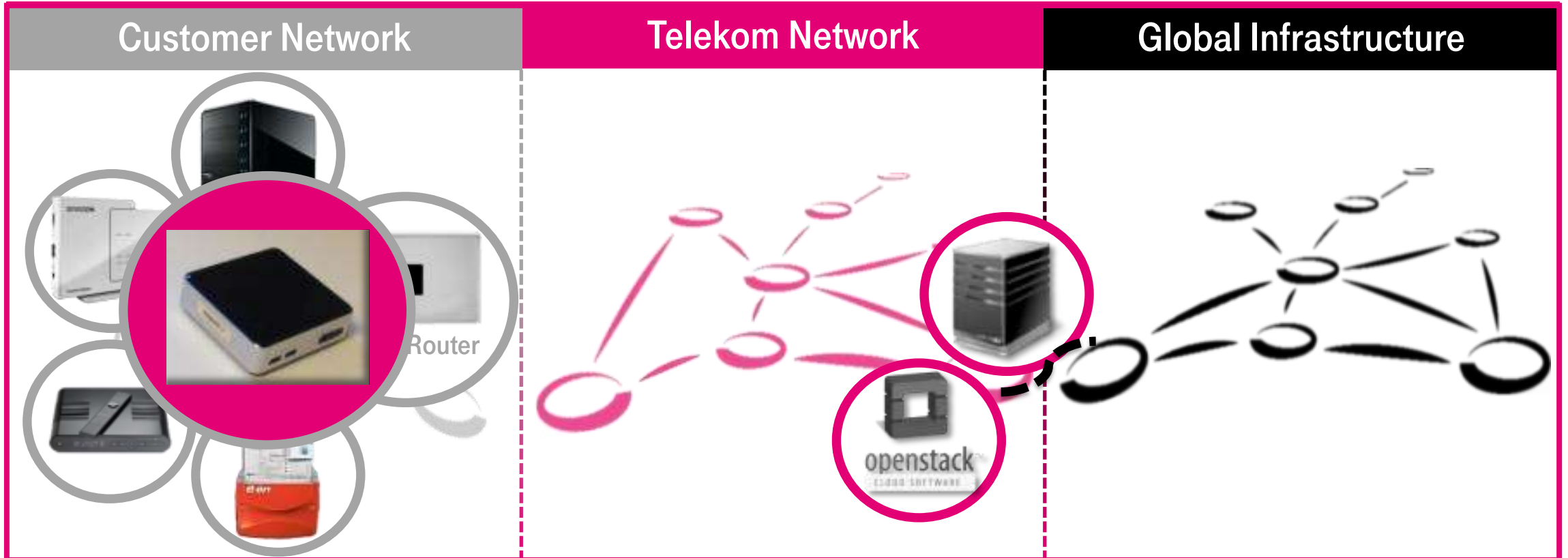
Telekom Innovation Laboratories



Telekom Innovation Laboratories

EXTENDED APPROACH UTILIZING GATEWAYS & CLOUD.

FLEXIBLE PROVISIONING OF ENTERPRISE & HOME NETWORK SERVICES.

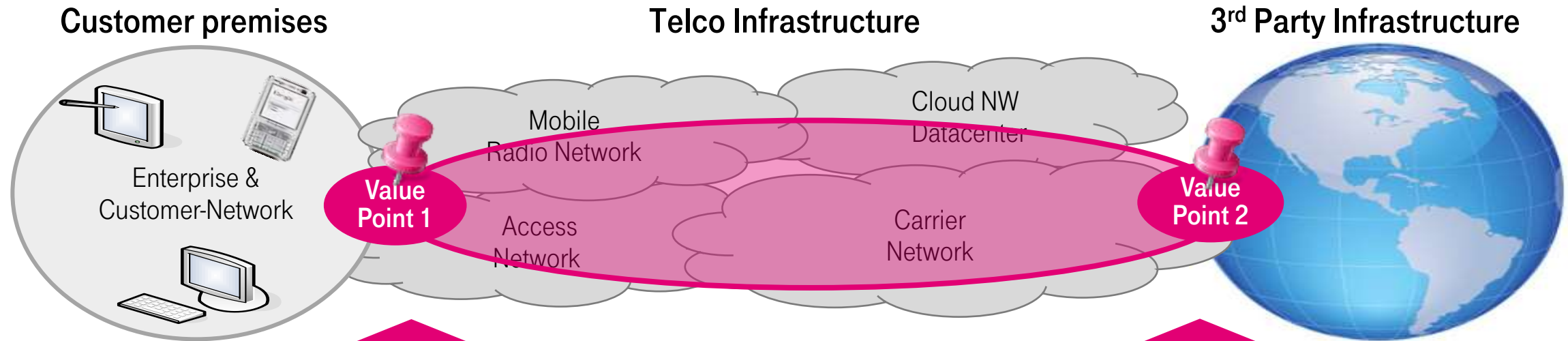


The background of the slide is an abstract, low-poly geometric pattern in various shades of pink and magenta. The shapes are irregular polygons of different sizes, creating a complex, crystalline texture. The colors range from light, almost white pinks to deep, dark magentas.

**Is this a contradiction to
the cloud approach?**

VALUE POINTS.

FLEXIBLE SERVICE CREATION.



Interfaces to the end customer network – Value generation through:

- Quality and performance control
- Remote-management-functions
- Security and reliability
- Reducing complexity

Interface to other operators, content providers and OTTs – Value generation through:

- Addressable customers and revenue potential
- Guarantee quality and delivery
- Relevance of functions High regional coverage

BUSINESS OPPORTUNITIES – EXAMPLES.

MANIFOLD OPPORTUNITIES –

PROPOSITIONS FOR CONSUMERS, ENTERPRISES AND OTT/MEDIA PLAYERS.

WI-FI ALLIANCE

- **PROPOSITION:**
Alliance-wide HotSpot service: access with unified registration and management of all public or semi-public cross-operator HotSpots
- **TARGET CUSTOMERS:**
Consumers



CLOUD VPN

- **PROPOSITION:**
Alliance-wide dynamic, demand-driven config. and provisioning of VPN service with enhanced end-to-end QoS, security, etc., seamlessly across NWs
- **TARGET CUSTOMERS:**
Enterprise customers



MISSION-CRITICAL B2B2C

- **PROPOSITION:**
IaaS, QoS, security etc. for entire production chain through config. of virtual slices – connecting data center resources with elements in households globally
- **TARGET CUSTOMERS:**
Health, energy solution providers



CONTENT/MEDIA ACC.

- **PROPOSITION:**
Alliance-wide resource access through “Content-API” for enhanced quality, flexibility, priority etc. with higher reach of eyeballs through enlarged footprint
- **TARGET CUSTOMERS:**
OTT/CDN/content providers



CLOUD DATACENTER

- **PROPOSITION:**
Demand-driven provisioning and config. of XaaS within DC and outbound efficiency gains between DCs with guaranteed performance beyond own footprint
- **TARGET CUSTOMERS:**
Enterprise customers



Is this a contradiction to the cloud approach ?

Not at all, it extends principles of cloud & automation to allow improved and more flexible solutions.

THANK YOU FOR YOUR ATTENTION!

