1. QUICK RE-CAP ACCESS 4.0 / A4
2. ACHIEVEMENTS SINCE LAST YEAR AND CURRENT STATUS
3. SPECIAL HIGHLIGHTS
4. NEXT STEPS
1. QUICK RE-CAP ACCESS 4.0 / A4

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4. NEXT STEPS
"We develop a cost-efficient, lean-to-operate and scalable access platform to deliver Gigabit products."
RECAP FROM 2017: ACCESS 4.0 IS THE DESIGN OF A NEW ACCESS PLATFORM WITH TIGHT COUPLING TO A COST MODEL

**GIGABIT READY TECHNOLOGY**

- FTTH/xPON
- FTTB/G.FAST
- HYBRID
- FTTC/xDSL
- 4G/5G
- ...  

**COST MODEL**

- Cost model developed from day one
- **Strong interworking** between architecture / design and Cost modelling
- Comprehensive application of Design-to-cost methods

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1) Access 4.0 Point of delivery: production of broadband IP
INTRO
WHAT IS ACCESS 4.0 / A4?

SCOPE OF ACCESS 4.0
- Extensive D2C project for FTTH/B
- Everything monitored in a comprehensive Cost Model
- Design and engineering using bare metal / OCP hardware, lots of open-source software as well as merchant silicon
- Application of data center principles, leaf/spine fabric, CI/CD pipes etc.
- Clean IT architecture (Las Vegas principle), which is extensible for other use cases
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BUT WAIT A SECOND!
WHICH PROBLEM DID WE ACTUALLY WANT TO SOLVE?

BREAK THE VENDOR LOCK

Architecture: the way DT runs its bread and butter business is highly dependent on key suppliers.

Processes: DevOps, SRE etc. models are not supported by current suppliers.

INCREASE AUTOMATION

Personnel: most challenges are still dealt with the “problem doubles, we double the people.”

Quality: Automated testing allows to substantially increase the test scope and hence improve quality

REDUCE TIME-TO-MARKET

Openness: open interfaces and open standards foster competition as well as innovation

CI/CD: web-scale service providers shift their challenges to software. This allows them to implement several 100 changes per day.

ENSURE FAIR PRICES / ALLOW FOR D2C

Transparency: Separation of HW and SW increases the cost transparency and allows to optimize with D2C methods

Open source software: nothing is for free, but efforts for design, dev and testing can be shared

ACCESS 4.0 | LIFE IS FOR SHARING.
# A4 Turned Two in Summer. What Has Been Achieved for FTTH/B?

## REAL CODE RUNNING FTTH/B@A4

- Multiple PPPoE sessions ✓
- All based on *bare metal + open source* (K8s, vOLTHA) ✓
- Focus on **automation** (ONT bring-up, ZTP / capacity- and change mgmt. etc.) ✓

## FEASIBILITY STUDY FINALIZED AND COST MODEL DEVELOPED

- Document shared with 30+ experts within DT ✓
- Assumptions and technology in Cost Model documented; Cost Case is green ✓

## COLLABORATION / COMMUNITY

- OCP spec for OLT submitted ✓
- ONF-Community event **June 2018** ✓
- Code contribution for vOLTHA ✓
- Alignment with other Operators ✓

## RFQ FOR CO-DEV PARTNERSHIP FTTH/B@A4

- RfQ issued in June, finalized end of November ✓
- Objective: find a partner who shares vision and wants to **productize** the A4 design
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OPEN COMPONENTS IN ACCESS 4.0 PROTOTYPE

**Hardware**
- XGS PON OLT + ONT
- Bare metal switches
- x86 Servers

**Software**
- Open Network Linux
- Ubuntu Linux
- Kafka
- Kubernetes, Docker + lxc container, KVM
- Device abstraction via vOLT-HA and ONOS
- Service Edge on Tofino and Qumran (PPPoE, CP and UP)
- POD Life Cycle Manager (LCM)
- POD Control Plane (PPA, “Weiche”)
- POD EMS, Grafana

Open source / open spec
TIERED SERVICE EDGE WILL “SLICE THE ELEPHANT”.

ANY customer traffic from DT network

TIER 0
“WEICHE”

DT-owned
SDN session
steering application

TIER 1
MULTI
SERVICE EDGE

Wholebuy

Retail - DT customers

Consumer – Wholesale
Today: Rose garden
Objective: Potato field; rose garden only if paid for

Business – DT
Today: Rose garden
Objective: Rose garden if paid for
A KEY COMPONENT: THE PPA (POD-TO-PFS-ABSTRACTION)

AN SDN BASED SERVICE EDGE WILL “SLICE THE ELEPHANT”.

STEP A
Attach ONU
Create Path

STEP B
Create PPPoE Session

THIS IS OUR BUSINESS LOGIC
THE CODE IS Ours...
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### SUMMARY: ACCESS 4.0 AT DEUTSCHE TELEKOM
WE ARE PART OF A STRONG COMMUNITY

#### CORE FINDINGS
- Access network **re-design works**: Prototype runs! Field trial runs!
- Open HW, SW: game-changer.
- Some things we can do on our own, some are better done by partners
- Keep control of **our** business logic (TTM!)
- Encapsulate proprietary, “hard to copy” technology in common/open APIs

#### AHEAD OF US
- **Productize** with partners
- Fostering the **ecosystem** with partners
  - Business Model & Roles
  - Standards (BBF, IETF, ...)
  - Open Source (ONF, LF, ...)
  - Hardware and drivers (OCP, TIP, ...)
- **Jointly develop** the **technologies** further
  - In-house with partners
  - In external communities such as ONF
- We just embarked on the **digitalization journey**; now in **delivering mode**

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**Access 4.0**
**LIFE IS FOR SHARING.**

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Nov 2018