



## PROGRAM ACCESS 4.0 / A4

Hans-Joerg Kolbe, Thomas Haag (technical lead)

Robert Soukup (head of program)

December 2018 – ONF Connect



LIFE IS FOR SHARING.

- 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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# ACCESS 4.0 MISSION STATEMENT

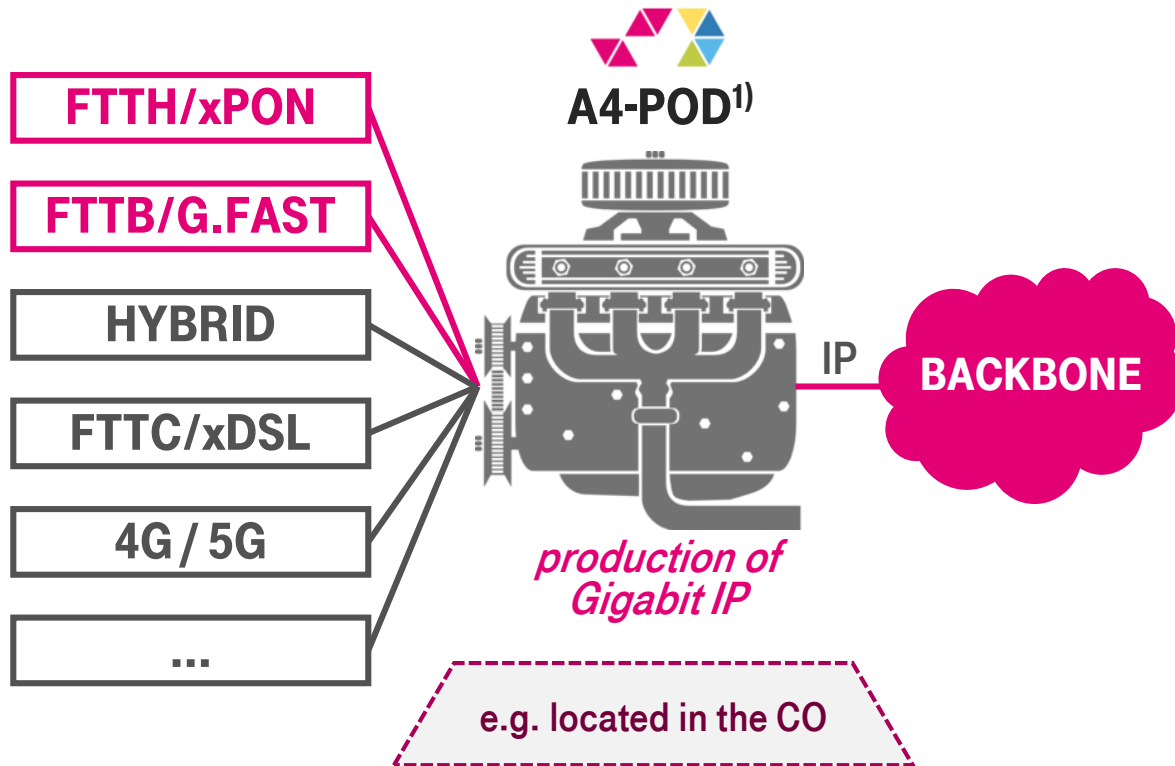


## ACCESS 4.0

*"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



## COST MODEL

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

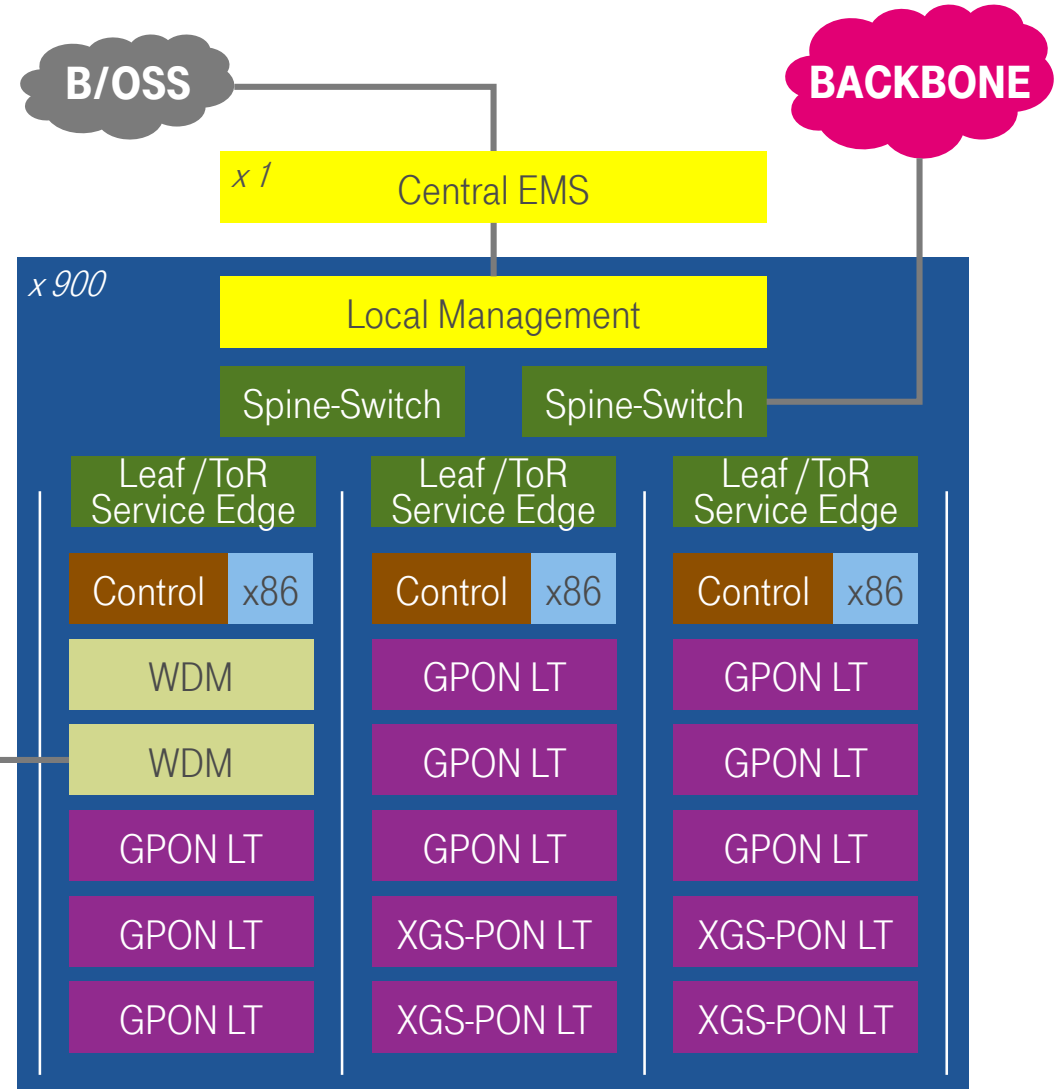


# INTRO

## 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?

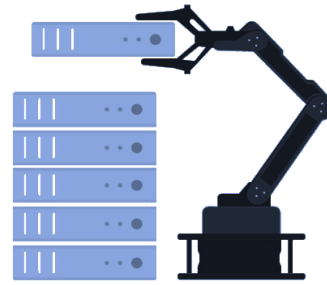
### BREAK THE VENDOR LOCK



**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<sup>1)</sup>



**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



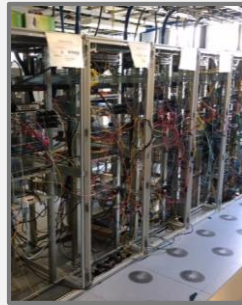
# A4 TURNED TWO IN SUMMER.



## WHAT HAS BEEN ACHIEVED FOR FTTH/B?

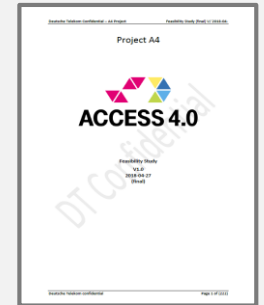
### 1 REAL CODE RUNNING FTTH/B@A4

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



### 2 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 ✓



### 3 COLLABORATION / COMMUNITY

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



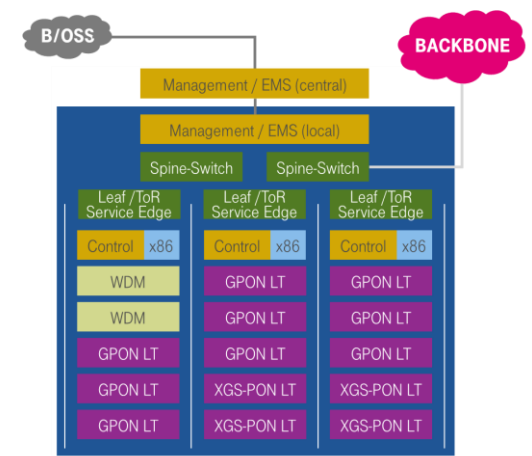
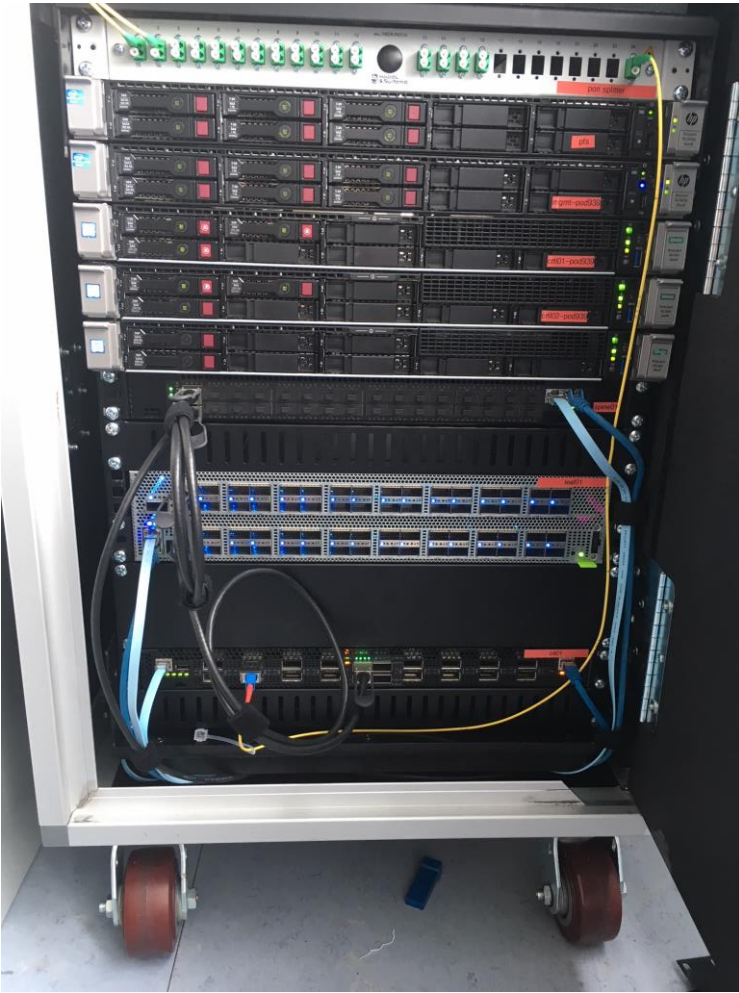
### 2 RFQ FOR CO-DEV PARTNERSHIP FTTH/B@A4

- **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

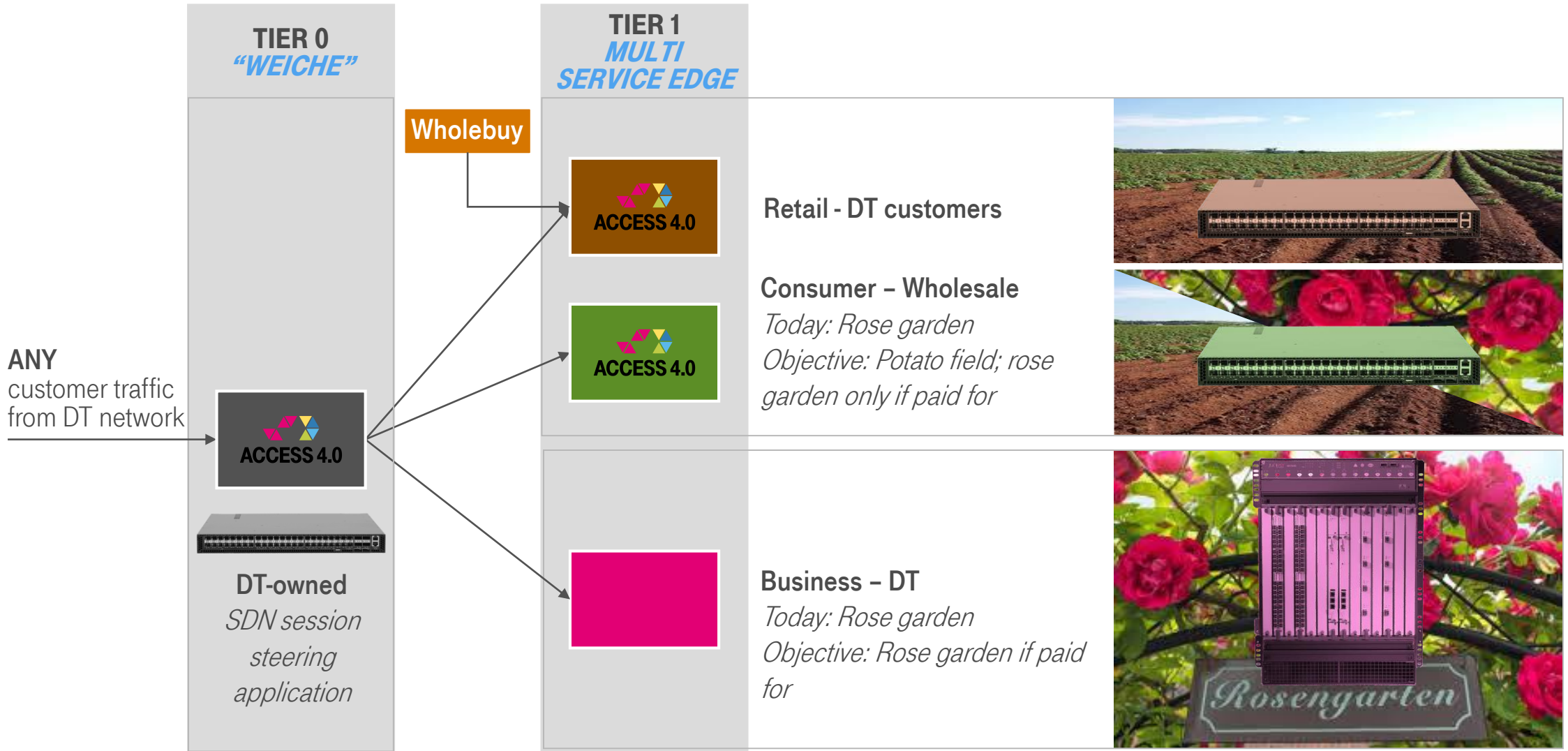


- ### Hardware
- XGS PON OLT + ONT
  - Bare metal switches
  - x86 Servers

- ### 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”.





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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**