EUROPEAN AVIATION NETWORK

Online Press Conference
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EUROPEAN AVIATION NETWORK

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DR. ROLF NAFZIGER, SVP
DEUTSCHE TELEKOM

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WORLD'S FIRST INTEGRATED SATELLITE AND AIR TO GROUND CONNECTIVITY NETWORK

EUROPEAN AVIATION NETWORK

COMPLETED!

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A WORLD-LEADING CONNECTIVITY PLATFORM SPECIFICALLY DESIGNED

FOR EUROPE'S BUSY AIRSPACE

1

STATE-OF-THE-ART SATELLITE

Around 300

HIGH PERFORMANCE LTE BASE STATIONS

30

EUROPEAN COUNTRIES

THE WORLD'S FIRST FULLY INTEGRATED SATELLITE AND AIR TO GROUND CONNECTIVITY NETWORK

- First **European-wide mobile network**
- Unprecedented **performance**
- Most efficient **spectrum usage**
- High **scalability**

- **Low Latency**
- **High** and **adaptable capacity**
- **Consistent** and **reliable connectivity**

- **Massive bandwidth** exclusively for **Aviation**
- **Best passenger experience** in the highest flight density in the world

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WORLD FIRST THROUGH UNIQUE

CROSS BORDER COLLABORATION

16 DT NatCo & LBU Subsidiaries

30 Countries with coverage

50+ Local Loop & Tower Companies

160+ DT Team Members delivering EAN

2.646 Rollout milestones tracked

3.100 Kilometers biggest span (West-East)

292 LTE Network cell sites

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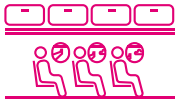
ONE OF THE WORLD'S BUSIEST AIRSPACE:

EUROPE

22.500 | FLIGHTS PER DAY

4,5% P.A. | STRONG AND RESILIENT PASSENGER GROWTH



500 MN | PASSENGERS PER YEAR

+80%

OF EUROPEAN PASSENGERS ARE EAGER TO HAVE **HIGHSPEED CONNECTIVITY ON BOARD**

54%

WOULD CHOOSE **IN-FLIGHT CONNECTIVITY** OVER AN IN-FLIGHT MEAL

69%

OF PASSENGERS ARE WILLING TO PAY FOR **IN-FLIGHT CONNECTIVITY**

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EAN DISTINCT ADVANTAGES –

ACROSS THE BOARD!

BANDWIDTH & CAPACITY

EAN PROVIDES **> 75 MBIT/S PEAK RATE** TO THE AIRCRAFT.

CONNECTION LATENCY

EAN CONNECTIONS PROVIDE TYPICALLY **< 100 MILLISECONDS** LATENCY – **UNPRECEDENTED IN AVIATION**.

SCALABILITY & GROWTH

EAN'S NETWORK **CAPACITY IS CONSTANTLY UPGRADED** TO MEET TRAFFIC DEMAND.

SYSTEM AVAILABILITY

EAN'S **COMBINED SAT/LTE NETWORK PROVIDES HIGHER AVAILABILITY** THAN THE COMPETITION.

INSTALLATION & MAINTENANCE

EAN EQUIPMENT **INSTALLATION TIME IS DRASTICALLY SHORTER – 4X MORE COST EFFECTIVE** THAN WITH THE COMPETITION.

WEIGHT & DRAG

EAN EQUIPMENT IS SIGNIFICANTLY **SMALLER & LIGHTER – 3X LESS ADDITIONAL KEROSENE CONSUMPTION THAN COMPETITION**.

AVIATION EXCLUSIVITY

AIRLINES ON EAN **DO NOT SHARE NETWORK CAPACITY WITH ANY OTHER INDUSTRY** OR USER-TYPE.

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WITH DEUTSCHE TELEKOM, EVERYWHERE

ALWAYS BEST CONNECTED

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FREDERIK VAN ESSEN
SVP
INMARSAT AVIATION

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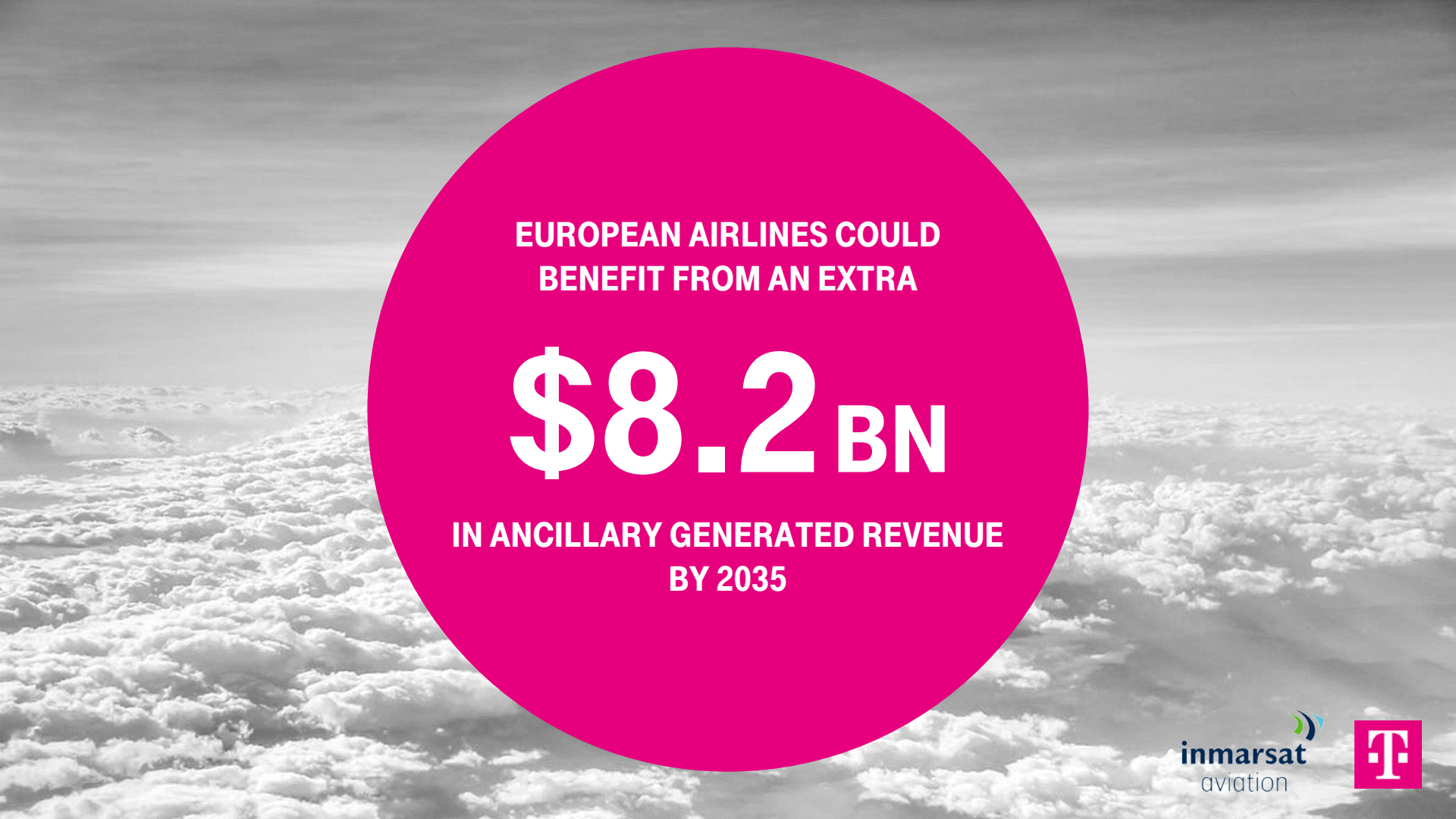
EUROPEAN AIRLINES COULD
BENEFIT FROM AN EXTRA
$8.2 BN
IN ANCILLARY GENERATED REVENUE
BY 2035
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aviation

THE CHALLENGE

AMONGST THE BUSIEST AIRSPACE IN THE WORLD

- EAN is the world's first integrated network for inflight Wi-Fi
- S-Band satellite successfully completed in-orbit tests in 2017
- Satellite working seamlessly with the EAN ground network
- EAN aircraft system is now being tested in a fully integrated way

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EAN NETWORK IS READY TO GO:

- SUCCESSFUL FLIGHT TRIALS
- EAN MEETING ITS DESIGN PERFORMANCE IN REALITY
- FIRST CLASS INFLIGHT INTERNET
- RESILIENT, LOWER COST TO OPERATE
- UNMATCHED PERFORMANCE & CAPACITY

EUROPEAN AVIATION NETWORK

THORSTEN ROBRECHT
VP
NOKIA

EUROPEAN AVIATION NETWORK

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NOKIA LTE AIR-2-GROUND SOLUTION

- Special LTE-Solution for the EAN based on Nokia's Air-to-Ground technology
- Special requirements:
  - Works at speeds of up to 1200 km/h
  - In 10 km height
  - Requires large cells of up to 150 km in range
- Developed special up tilt antenna to cover sky
- Base solution includes baseband unit, adapted Nokia LTE radio heads, antennas and GPS module

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NOKIA LTE AIR-2-GROUND TECHNOLOGY CHALLENGES

LTE connection despite high speed

- Nokia Bell Labs algorithms provide robust Doppler estimation and compensation caused by aircraft high speed (up to 1200 km/h)
- Results in stable signal

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NOKIA LTE AIR-2-GROUND – TESTING AND ROLLOUT

End-to-end live testing at Nokia lab in Stuttgart

First successful flight tests in commercial network in November 2016 – throughput beyond 75 Mbit/s

- Rollout of 300 base stations
- Built first integrated network across Europe
- Network planning tools for ideal site locations
- Operation and maintenance of EAN ground network

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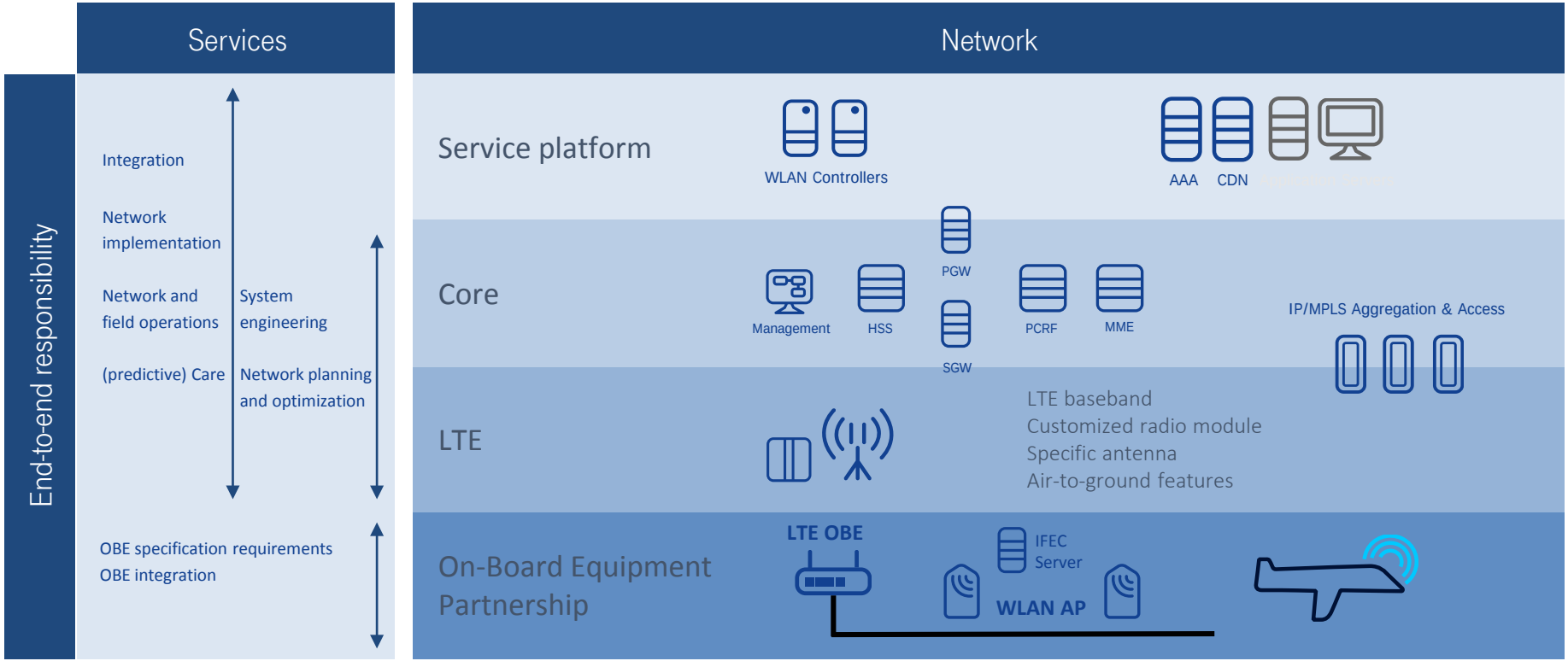
LTE AIR-2-GROUND: END-TO-END TURNKEY SOLUTION



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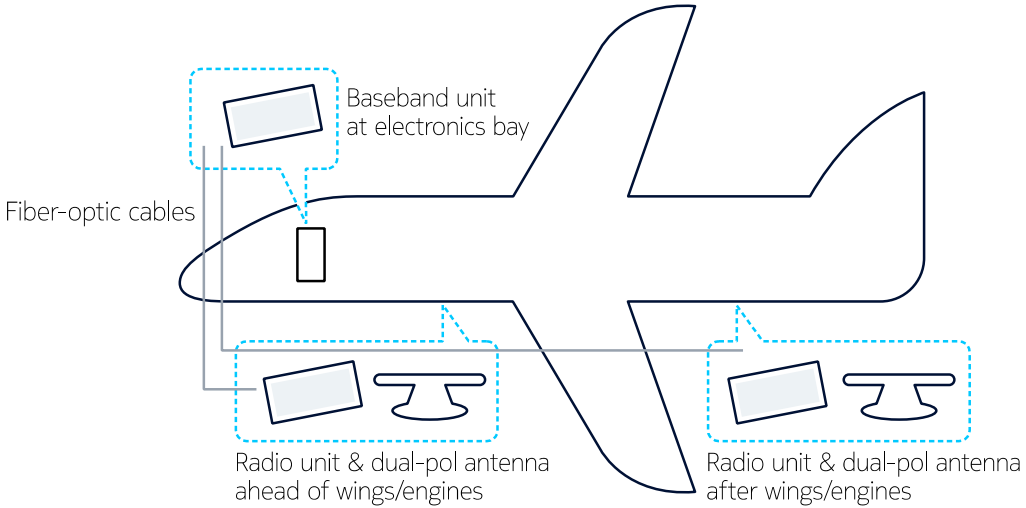
ON BOARD EQUIPMENT – AIRCRAFT TERMINAL SYSTEM



- Thales aircraft terminal system and Nokia LTE network are an integrated end-to-end system
- Connects to the Connectivity Server and the Wi-Fi access points in the cabin
- Transfers the passenger traffic to the ground
- Throughput beyond 75 Mbit/s
- Scalable system for future upgrades

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LTE AIR-2-GROUND – SUMMARY

FIRST AND ONLY

- Unique LTE solution created with special Air-to-Ground algorithms to work with Satellite
- Solution thoroughly tested

TURNKEY END-TO-END

- Built and integrated the EAN ground network across Europe on behalf of Deutsche Telekom

IN THE NEXT YEARS

- Operations and maintenance it on behalf of Deutsche Telekom

Q&A

THANK
YOU

www.EuropeanAviationNetwork.com

www.telekom.com