



## Siae Microelettronica - Product Strategy for 5G

# ...65 YEARS of RESEARCH and DEVELOPMENT...



Last 4 years  
Compound Average  
**GROWTH RATE**  
+4%

**Transceivers**

**90+**

**Country of  
Operations**

**350K**

**Product/Service**

**1600**

**Employees Worldwide**

**300M  
USD**

**GLOBAL  
REVENUES**

**70/30**

# Global References

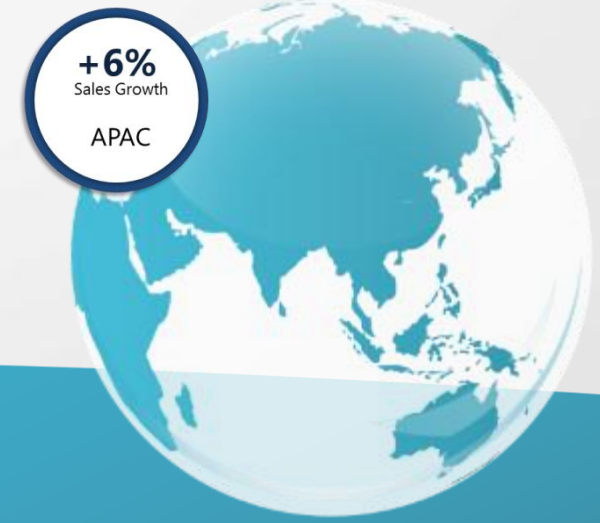
## AMERICAS



## EUROPA MIDDLE EAST, AFRICA



## ASIA PACIFIC and CHINA



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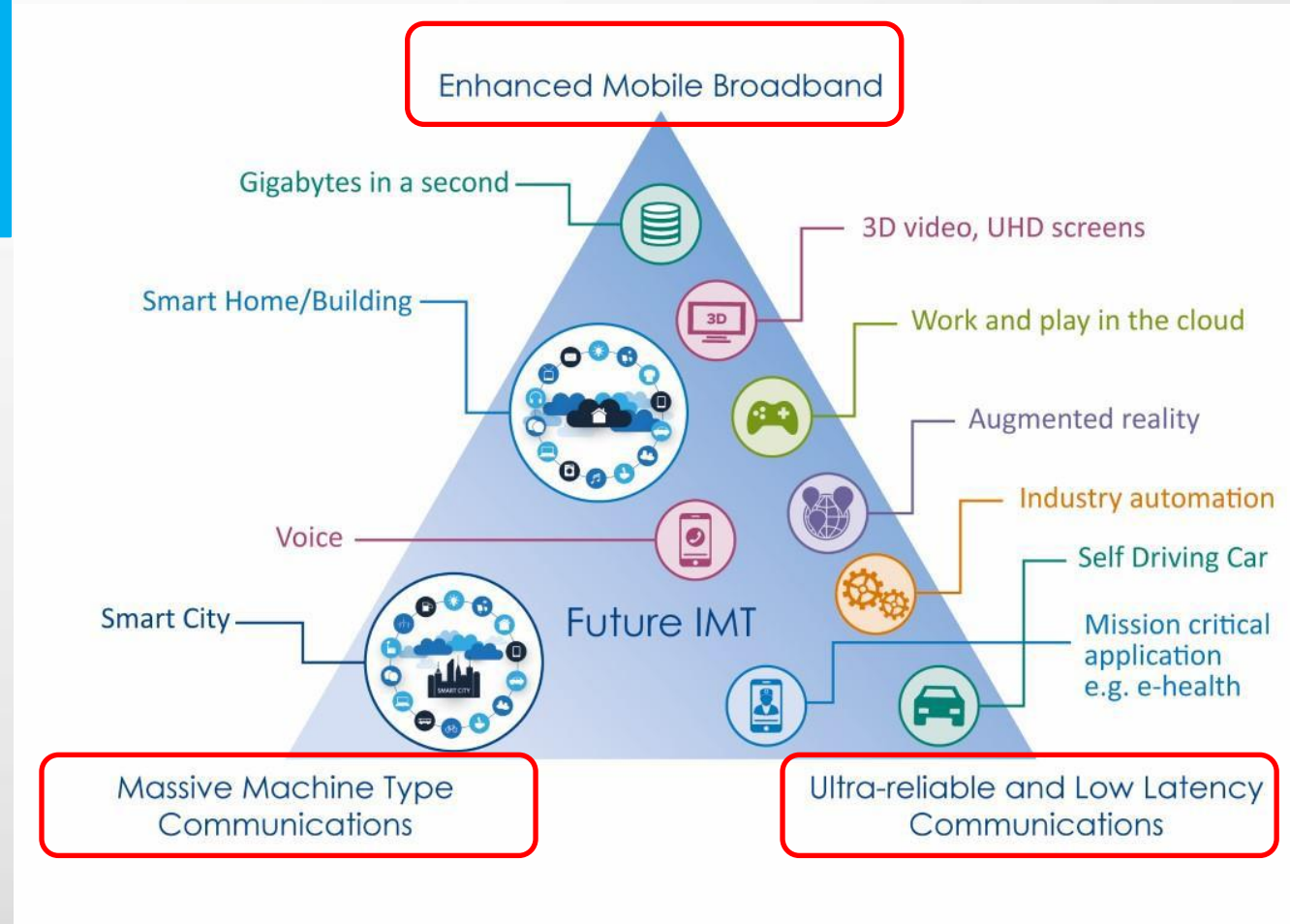
# Challenging issues facing operators toward 5G

How to capture new revenues on their 5G infrastructure investments

Enhanced Mobile Broadband

URLLC: Ultra Reliable Low Latency applications

Massive Machine Type Communications



# Explore technology solutions to cost-effectively upgrade telecom networks

HIGH CAPACITY

01

10Gb e-band: ALFOplu80HDX



LONG DISTANCE

02

Eband long Distance  
Multiband

100 microseconds

03

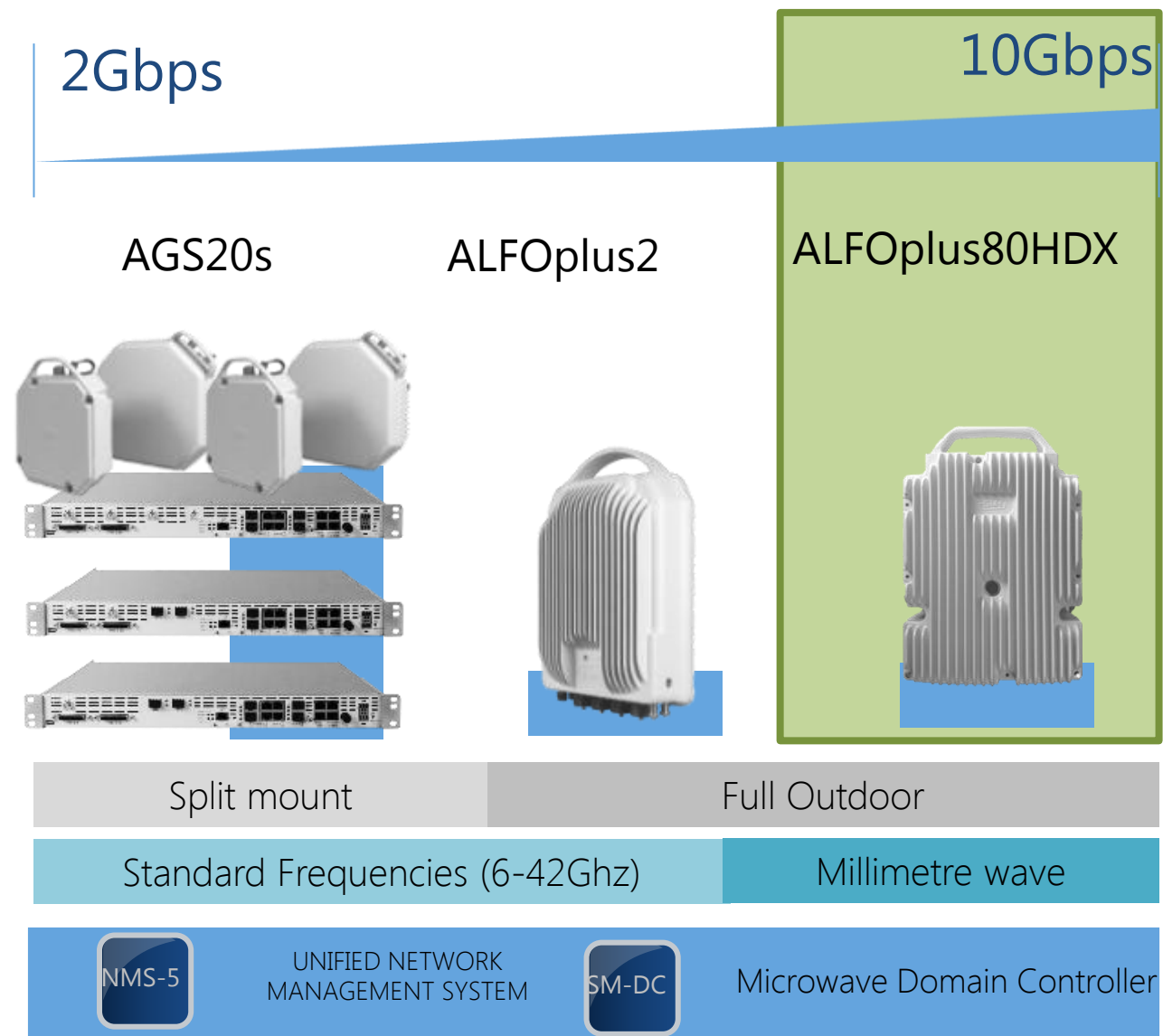
LOW LATENCY

SOFTWARE DEFINED  
SDN controller; SDN NE; SDN APPs

04

NETWORK  
AUTOMATION

# Product portfolio toward 5G



EMBs: High Capacity

Traditional band:  
2Gbit in 1ch XPIC/112Mhz 4096QAM

E band & Multiband  
10Gbit

URLLC: Ultra Reliable Low Latency applications

High reliability:  
meshed topology with L3 Microwave

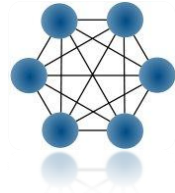
Low Latency MW <100us

6 to 42 GHz  
Zero-Footprint  
RF multicore

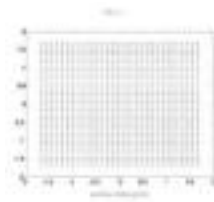
ALFOplus2



2+Gbps



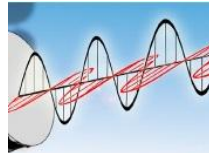
SDN Native



4096 QAM to achieve high  
bandwidth optimization



Dual core  
2x112 MHz ch.



XPIC in a single ODU  
4x4 MIMO expandibility

# ALFOplus2

## The RF multicore solution



Uncompressed data  
rate 2+ Gbps



Carrier Eth MEF 2.0  
L3 IP-MPLS



Full frequency coverage  
6 ÷ 42 GHz



ACM for higher  
availability

# 5G: High capacity solutions

Millimetre Wave  
E-Band

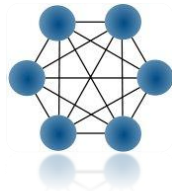
**ALFOplus80HDX**



Up to 10Gbps  
throughput per carrier



256QAM /ACM /XPIC



MPLS and SDN native

Ch

From 62.5Mhz to 2000  
GHz channels



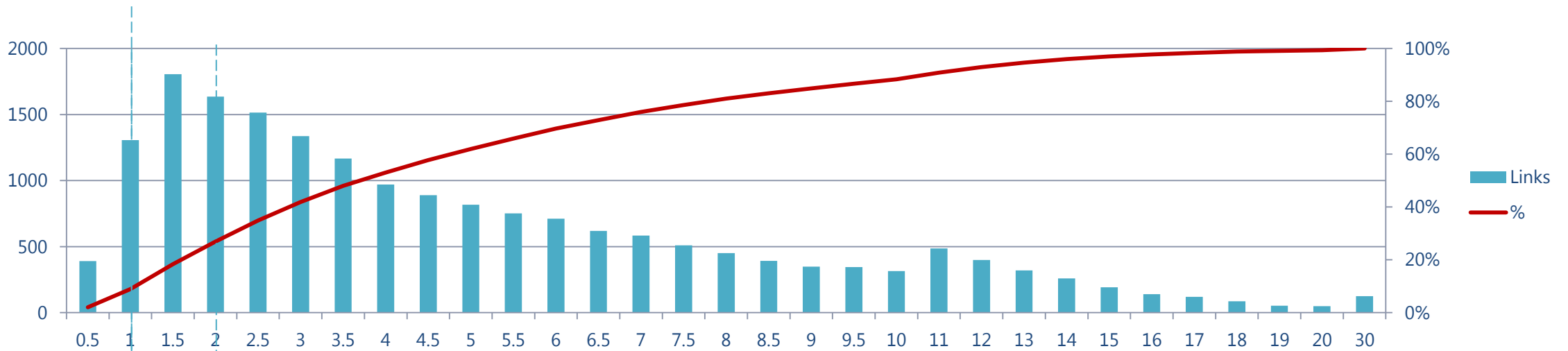
Max Distance  
145mmh RAIN ZONE

1000Mhz	Max distance	Availability
1G	0.45Km	99.999%
4QAM	0.85Km	99.995%
10G Max mod.	2Km	99.9%

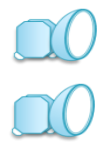
250Mhz	Max distance	Availability
220Mbit	0.65Km 1.2Km	99.999% 99.995%
3G	2.5Km	99.9%



# 20K MW Links distribution vs. distance



10 Gbs



*E-Band with 60cm*

1Gbs @ 99.999 %  
 1Gbs @ 99.995 %  
 10 Gbs @ 99.9 %

**High capacity System gain and directivity issues above 60cm antenna limits E-Band applicability in 1Km**

# 5G: Eband Long reach

## High system gain solutions

Usage of large antenna is not possible due to tower thermal deformations caused by solar irradiation.

+10dB



**ALFOplu80HDX  
HP with  
80GHz Booster**

+16dB



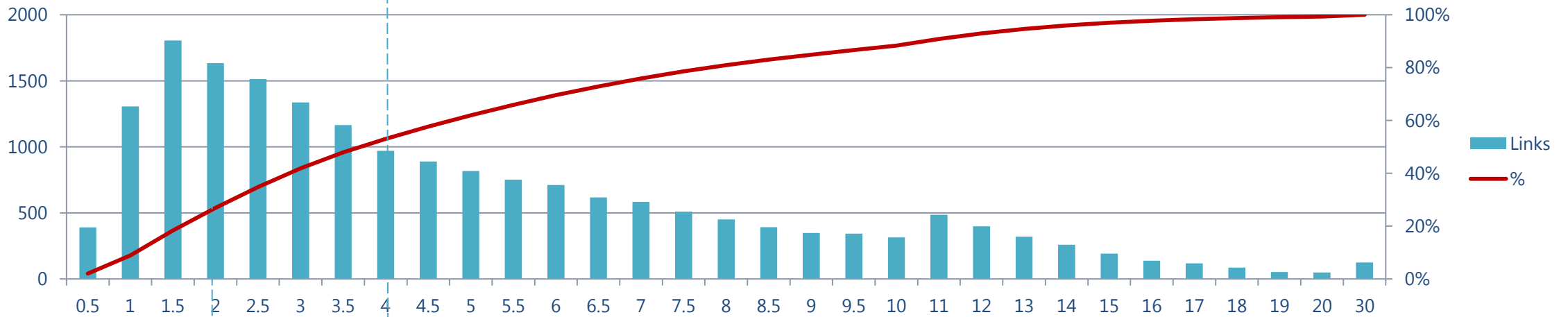
**Booster  
Hi-Gain Antenna  
+ low-cost beam  
tracking**

Max distance  
145mmh RAIN ZONE

1000Mhz	Max distance	Availability
1.25G	0.9Km 1.7Km	99.999% 99.995%
10G	4Km	99.9%

250Mhz	Max distance	Availability
300Mbit	1.3Km 2.4Km	99.999% 99.995%
3G	5Km	99.9%

# 20K MW Links distribution vs. distance



**10 Gbs**

● —● 18%

● —● 50%

*E-Band with 90cm beam steerable*

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● —● 20%

*Multiband 60cm*  
Limiting factor is the best effort traffic

> 8 Mbs @ 99.995 %  
10 Gbs @ 99.9 %

**Multiband increase the reach up to 48% of macro sites but still critical for misalignment**

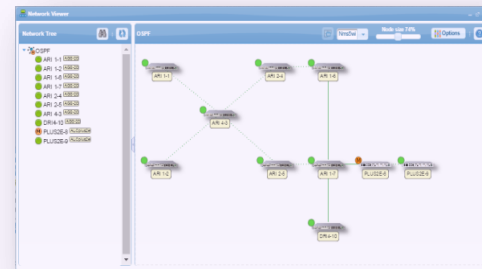
# Network automation thorough SDN

## SDN Controller SM-DC



- Native SDN network element
- SDN Controller
- NETCONF Manager
- Support to ONF/IETF YANG models
- Northbound RESTCONF T-API for connection to upper layer SDN orchestrator

## Path-Provisioning



- MEF Compliant service creation
- QoS Management
- OAM provisioning
- Automatic Path computation

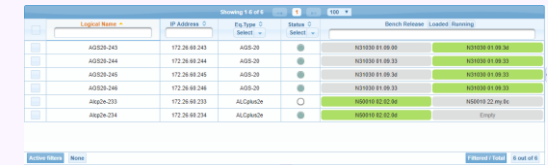
## iVeritas



Optimize network performances

- Ethernet Utilization
- Ethernet Congestion
- Radio Link Performances
- Received Signal Power

## Smart Firmware Upgrade



Upgrade Name	IP Address	File Type	Status	Search Network	Loaded	Uploading
AGS23-243	172.28.88.243	AGS-23	●	10/10/2018 01:00:00	10/10/2018 01:00:00	
AGS23-244	172.28.88.244	AGS-23	●	10/10/2018 01:00:00	10/10/2018 01:00:00	
AGS23-245	172.28.88.245	AGS-23	●	10/10/2018 01:00:00	10/10/2018 01:00:00	
AGS23-246	172.28.88.246	AGS-23	●	10/10/2018 01:00:00	10/10/2018 01:00:00	
AGS24-233	172.28.88.233	ALC/AGS24	○	10/10/2018 01:00:00	10/10/2018 01:00:00	
AGS24-234	172.28.88.234	ALC/AGS24	●	10/10/2018 01:00:00	10/10/2018 01:00:00	

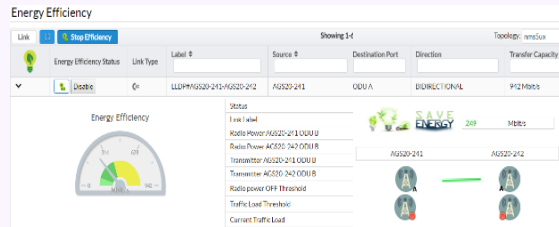
Zeroes operator intervention for Network Software Download

- Multiple concurrent projects management

## SDN applications

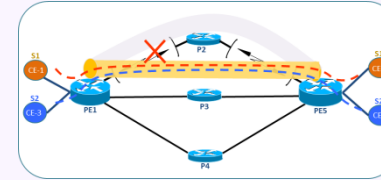
# SDN applications

## Energy Efficiency



Optimize network power consumption activating Radios capacity on traffic needs and specific time windows.

## IP/MPLS rerouting



Optimize Services & traffic path based on external input (weather, traffic, end to end network params, ...)



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**THANK YOU**

**SM**  **siae microelettronica**

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