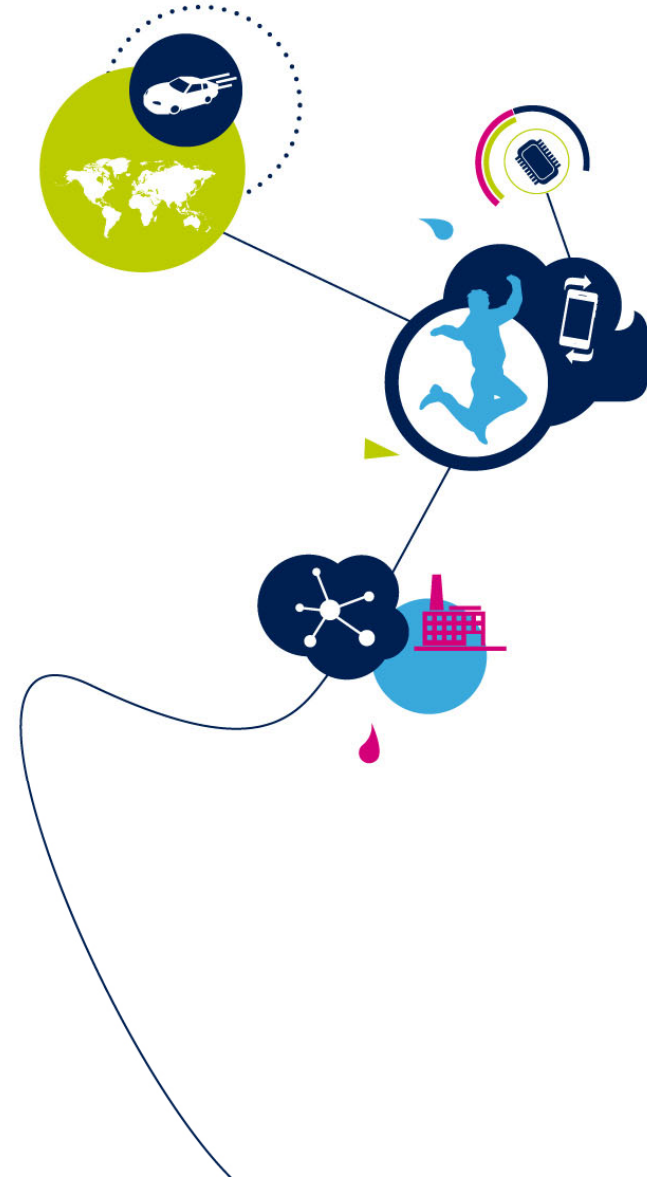




STMicroelectronics

February 26, 2019
Barcelona



Forward Looking Statements

Some of the statements contained in this release that are not historical facts are statements of future expectations and other forward-looking statements (within the meaning of Section 27A of the Securities Act of 1933 or Section 21E of the Securities Exchange Act of 1934, each as amended) that are based on management's current views and assumptions, and are conditioned upon and also involve known and unknown risks and uncertainties that could cause actual results, performance, or events to differ materially from those anticipated by such statements, due to, among other factors:

- Uncertain macro-economic and industry trends, which may impact end-market demand for our products;*
- Customer demand that differs from projections;*
- The ability to design, manufacture and sell innovative products in a rapidly changing technological environment;*
- Changes in economic, social, labor, political, or infrastructure conditions in the locations where we, our customers, or our suppliers operate, including as a result of macro-economic or regional events, military conflicts, social unrest, labor actions, or terrorist activities;*
- Changes in global trade policies, including the adoption and expansion of tariffs and trade barriers, that could affect the macro-economic environment and adversely impact the demand for our products;*
- The Brexit vote and the perceptions as to the impact of the withdrawal of the U.K. may adversely affect business activity, political stability and economic conditions in the U.K., the Eurozone, the EU and elsewhere. While we do not have material operations in the U.K. and have not experienced any material impact from Brexit on our underlying business to date, we cannot predict its future implications;*
- Financial difficulties with any of our major distributors or significant curtailment of purchases by key customers;*
- The loading, product mix, and manufacturing performance of our production facilities;*
- The functionalities and performance of our IT systems, which support our critical operational activities including manufacturing, finance and sales, and any breaches of our IT systems or those of our customers or suppliers;*
- Variations in the foreign exchange markets and, more particularly, the U.S. dollar exchange rate as compared to the Euro and the other major currencies we use for our operations;*
- The impact of intellectual property ("IP") claims by our competitors or other third parties, and our ability to obtain required licenses on reasonable terms and conditions;*
- Changes in our overall tax position as a result of changes in tax rules, new or revised legislation, the outcome of tax audits or changes in international tax treaties which may impact our results of operations as well as our ability to accurately estimate tax credits, benefits, deductions and provisions and to realize deferred tax assets;*
- The outcome of ongoing litigation as well as the impact of any new litigation to which we may become a defendant;*
- Product liability or warranty claims, claims based on epidemic or delivery failure, or other claims relating to our products, or recalls by our customers for products containing our parts;*
- Natural events such as severe weather, earthquakes, tsunamis, volcano eruptions or other acts of nature, health risks and epidemics in locations where we, our customers or our suppliers operate;*
- Availability and costs of raw materials, utilities, third-party manufacturing services and technology, or other supplies required by our operations;*
- Industry changes resulting from vertical and horizontal consolidation among our suppliers, competitors, and customers;*
- The ability to successfully ramp up new programs that could be impacted by factors beyond our control, including the availability of critical third party components and performance of subcontractors in line with our expectations; and*
- Theft, loss, or misuse of personal data about our employees, customers, or other third parties, and breaches of global privacy legislation, including the EU's General Data Protection Regulation ("GDPR").*

Such forward-looking statements are subject to various risks and uncertainties, which may cause actual results and performance of our business to differ materially and adversely from the forward-looking statements. Certain forward-looking statements can be identified by the use of forward looking terminology, such as "believes," "expects," "may," "are expected to," "should," "would be," "seeks" or "anticipates" or similar expressions or the negative thereof or other variations thereof or comparable terminology, or by discussions of strategy, plans or intentions.

Some of these risk factors are set forth and are discussed in more detail in "Item 3. Key Information — Risk Factors" included in our Annual Report on Form 20-F for the year ended December 31, 2017, as filed with the SEC on March 1, 2018. Should one or more of these risks or uncertainties materialize, or should underlying assumptions prove incorrect, actual results may vary materially from those described in this release as anticipated, believed, or expected. We do not intend, and do not assume any obligation, to update any industry information or forward-looking statements set forth in this release to reflect subsequent events or circumstances.



Agenda

- 9:30 am Introduction
- ST Industrial End Market Approach
- Automotive and Discrete Group (ADG)
- Analog, MEMS & Sensors Group (AMS)
- Microcontroller and Digital ICs Group (MDG)
- Questions & Answers
- 11:00 am End



Speakers

Jean-Marc Chery
President & CEO

Marco Cassis
President, Sales, Marketing,
Communications & Strategy

Marco Monti
President, ADG

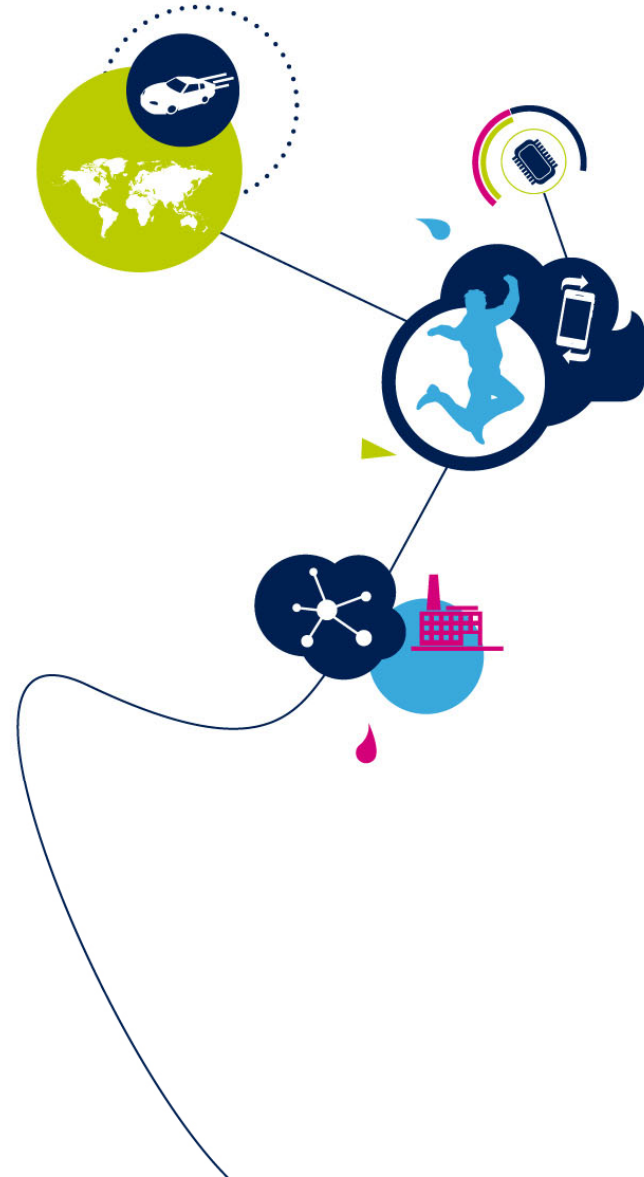
Benedetto Vigna
President, AMS

Claude Dardanne
President, MDG

Introduction

Jean-Marc Chery

President & CEO



Automotive



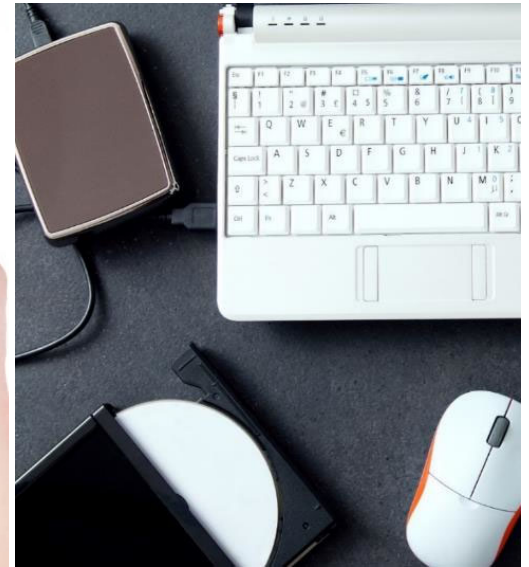
Industrial



Personal Electronics



Communications
Equipment,
Computers & Peripherals



ST Industrial End Market Approach

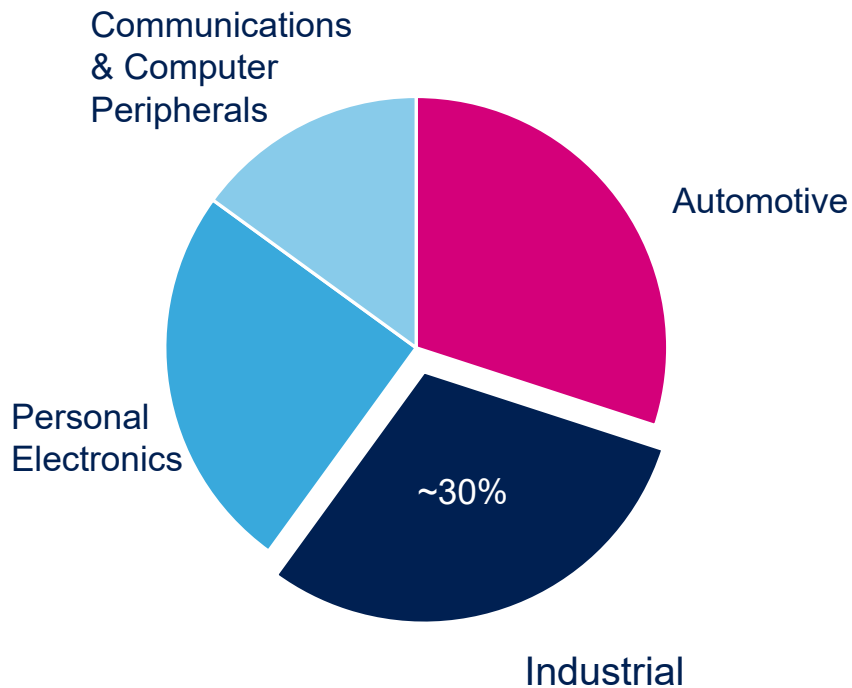
Marco Cassis

President
Sales, Marketing, Communications and Strategy Development



ST Industrial Sales

7



ST is a Top Player in Key Industrial Components

Rank	Industrial
1	Texas Instruments
2	Analog Devices
3	Intel
4	Infineon
5	STMicroelectronics



Rank	Analog IC
1	Texas Instruments
2	Analog Devices
3	STMicroelectronics

Rank	Microcomponents
1	Intel
2	Texas Instruments
3	Microchip
4	STMicroelectronics

Rank	Power Discretes
1	Infineon
2	STMicroelectronics

Rank	Sensors & Actuators
1	Analog Devices
8	STMicroelectronics



ST Approach in Industrial

Technologies & Products

Differentiated specialized technologies adapted to device development

BCD	Processing
ViPower	Security
eFlash FD-SOI 28nm	Sensing & Actuating
CMOS 40nm	Connectivity
SiC GaN	Conditioning & Protection
Power MOSFETs	Motor Control
	Power & Energy

Application Approach

Use deep industrial knowledge to develop solutions optimized for specific applications, combined with a broad general purpose portfolio



Market Approach

Target industry leaders with leading-edge products adapted to their needs



Target wider market with broad portfolio mainly through distribution



Motor Control	—
Brushed Motors	—
Brushed DC Motor	
Universal Motor	
Induction Motors	—
3-phase Induction Motor (ACIM)	
Single Phase AC Motor	
PMSM / BLDC motors	—
3-phase 6-STEP Control	
3-phase Field Oriented Control (FOC)	
Stepper Motors	—
Bipolar Stepper Motor	
Unipolar Stepper Motor	
Switched Reluctance Motors	—
Asymmetrical Half-Bridge PWM Drive	

Factory Automation	—
Condition Monitoring / Predictive Maintenance	
Industrial Communication	—
Contactless Communication (RFID / NFC)	
Fieldbus and Industrial Ethernet	
IO-Link Gateway	
Industrial Robots	
Industrial Sensors	—
Environment	
Image	
Motion and Vibration	
Proximity	
Programmable Logic Controllers (PLC)	—

Home and Professional Appliances	—
Garden Robots and Tools	—
Garden Tools	
Lawn Mower	
Pool Cleaner	
Large Appliances	—
Dishwasher	
Dryer	
Induction Cooking	
Kitchen Hoods	
Refrigerators and Freezers	
Washing Machines	
Small Appliances and Kitchen Aids	—
Coffee Machines	

Home, Building and City Automation	—
Building Safety and Security	—
Fire Alarm and Smoke Detector	
Smart Lock and Access	
Surveillance	
Climate Control	—
Air Quality Monitor System	
Central HVAC	
Heat Cost Allocators (HCA)	
Heating Control	
Room Air Condition (RAC)	
Thermostat	
Smart City	—
Smart Parking	

Power Supplies and Converters	—
AC-DC Converters	—
Buck and Buck-Boost Converter	
Flyback Converter	
Forward Converter	
LLC Resonant Converter	
PFC Converter - Single Phase Input	
PFC Converter - Three Phase Input	
PS ZVS FB Converter	
Two Switch Flyback Converter	
Two Switch Forward Converter	
Auxiliary SMPS	—
Isolated Auxiliary Power Supply 20-75W	
Isolated Auxiliary Power Supply up to 20W	

LED Lighting and Controls	—
HID and Fluorescent Lighting	—
HID Lighting	
High Frequency Ballast Solution	
LED Displays and Signage	—
LED Backlighting	
LED Displays for Signage	
LED Traffic Signals	
LED Lighting	—
LED General Illumination	
LED POE Lighting	
LED Street Lighting	
Lighting Controls	—
DALI Lighting Solution	
LED Wireless Programming	

Medical and Healthcare	—
Diagnostic Equipment	—
Blood Pressure Monitor	
Digital Thermometer	
Glucose Meter	
Patient Monitoring	
Medical Imaging	—
Magnetic Resonance Imaging (MRI)	
Ultrasound Imaging	
X-Ray and Computer Tomography	
Therapy Equipment	—
CPAP and Respirators	
Dialysis Machines	
Pills Distributors	
Powered Patient Beds	

ST offers Products and Solutions for a wide range of industrial applications

PLC Control Unit	
Safety PLC	
Tracking	—
Goods Guarantee	
Pallets and Container Tracking	

Metering	—
Electricity Metering	—
Data Concentrator Unit	
In Home User Device	
Single Phase Meter	
Smart Plug	
Three Phase Meter	
Gas Metering	
Heat Metering	
Water Metering	

Robot Vacuum Cleaners	
-----------------------	--

Energy Generation and Distribution	—
Energy Distribution	—
Commercial Battery Storage Systems	
DC Fast Charging Station	
Home Battery Storage Systems	
Solar Centralized Generation	—
Smart Junction Box	
Smart String Combiner Box	
Solar Inverters (String and Central)	
Solar Distributed Generation	—
Microinverter	
Power Optimizer	

Smart Home	—
Bridge and Gateway	
Garage Doors	
Smart Plug	
Window and Roller Shutters	

Smart Farming	—
Agricultural Products Tracking	
Irrigation Systems	—
Actuators, Valves and Pumps Control	
Control and Sensing	
Livestock Position and Health Monitoring	
Tractors	—
Actuators	
Guidance and Positioning	
Tractor Body	
Space	—
Payloads and Platforms	
Power Systems	

Buck Converter	
Buck-Boost Converter	

Industrial Power Supply	—
Uninterruptable Power Supplies (UPS)	

Server & Telecom Power	—
AC-DC PSU for Server and Telecom	
DC-DC PSU for Server and Telecom	
Power over Ethernet (PoE)	

Smart Chargers and Adapters	—
Adapters for Tablets, Notebook and AIO	
USB Type-C PD Adapters and Quick Chargers	
Wireless Chargers	

TV PSU	—
LED / OLED TV	

Industrial Drives	—
AC Drives	
Fans	
Forklift	
Pumps	
Servo Drives	

Industrial Power and Tools	—
Industrial Tools	—
3D Printers	
Computer Numerical Control (CNC)	
Industrial Drones	
Industrial Printers	
Power Tools	
Textile	
Valves Control	
Welding	

Point of Sales and Retail Logistics	—
Banking Automation	—
Currency Counter	
USB NFC Dongles	
Point of Sales	—
ePOS, ECR and Cash Drawer	

Mobile POS	
Payment Dongles	
Retail Logistics	—
Barcode Scanners	
Electronic Shelf Labels	
Goods Guarantee	
NFC HF Readers	
Pallets and Container Tracking	
Portable Data Terminals	
RAIN UHF Readers	



ST Technology Investments for Industrial

Analog & RF CMOS

Specific focus on industrial applications in technology development

eNVM CMOS

Serves Microcontrollers for Industrial

FD-SOI CMOS
FinFET through Foundry

Serves MPU & COT ASICs for Industrial

MEMS
For Sensors & Microactuators

Leveraging investments in Personal Electronics

Specific focus on industrial applications in technology development

Smart Power: BCD

Specific focus on industrial applications in technology development

Discrete, Passive Integration, Power MOSFET, IGBT Silicon Carbide, Gallium Nitride

Leveraging investments in Automotive

Vertical Intelligent Power

Leveraging investments in Personal Electronics

Specialized Imaging Sensors

Packaging technologies

Specific investments for Industrial Power Modules e.g. ACEPACK, SLLIMM



ST Product Strategies for Industrial

Products Designed for Industrial

Dedicated Industrial products covering a major part of a specific application

e.g. Smart Metering SoC with full system support

Dedicated Industrial products for a specific function in a specific application

e.g. I/O Driver for Programmable Logic Controllers

Dedicated Industrial products for a specific function covering multiple applications

e.g. Motor Control ICs, Power Discrete, Industrial MPU

Products from other target markets adapted for industrial specifics

e.g. Industrial sensors offering 10 year guarantee



General Purpose/ Multi-Market Products for Industrial

General purpose products requiring application-specific support

e.g. STM32 for Motor Control, Metering

Products sold across multiple end markets

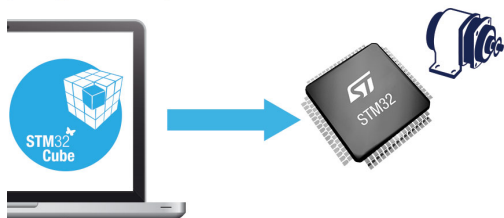
e.g. Wireless Connectivity, Security, ToF, EEPROM

Products from other target markets fitting with industrial applications

e.g. Automotive MCUs, ST60 RF mmW

General purpose products with no special support required

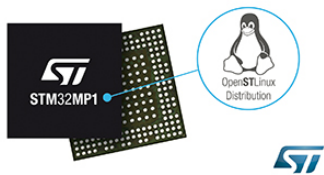
e.g. General Purpose Analog



New Products for Industrial Applications

Industrial MPU

New multicore STM32MP1 Series for Industrial and IoT applications



Industrial Safety

New safety-design package for STM32 MCUs



Smart Meters

STSAFE-J100 Certified and Flexible secure solution



Power Adapters

Power supplies & adapters are more reliable with new off-line converters



Condition Monitoring

High-accuracy MEMS accelerometer for advanced industrial sensing



Robotics

Industrial Magnetometer Reliable positioning and ranging



Factory Automation

Intelligent Power Switch rich diagnostics for Smart Industry



Logistics Tracking

Teseo-LIV3F module GNSS solution for Industrial and IoT



Building Automation

Tiny KNX transceiver for smart building automation



Power Supplies

Off-line high-voltage converters for rugged and flexible 5-30V power supplies



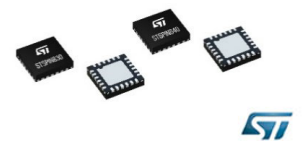
3D Printing

Plug-and-play STSPIN board for faster & smoother 3D printing



Medical Robots

Versatile motor drivers for industrial & medical applications



ST Go-To-Market Strategy for Industrial

Ecosystem to Support Design-in

Comprising hardware, software and documentation

Pervasive Technical Support

FAEs and training on the field

Strong Online Presence

Product data, design tools and application support online

Promotion Campaigns

Raise brand awareness extend reach

Development with lead OEMs

Build IP to be reused in the broader market and vice versa

Distribution Channel

Leverage local expertise and support



Automotive and Discrete Group

Marco Monti

President
Automotive and Discrete Group (ADG)





Automotive and Discrete Group 2018 – Key Financial Figures

ADG 2018 Revenues

\$ 3.56B
2018 Net revenues

**ADG
+16%**
2018 vs. 2017

ADG by Sub-Group

Automotive Product Sub-Group

\$2.22B

2018 Growth Rate



Power Discrete Sub-Group

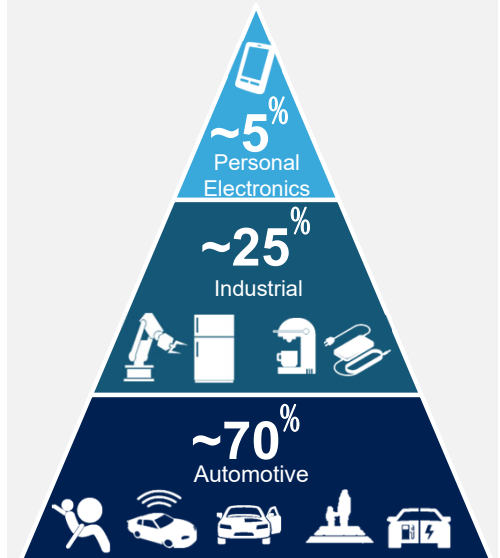
\$1.34B

2018 Growth Rate

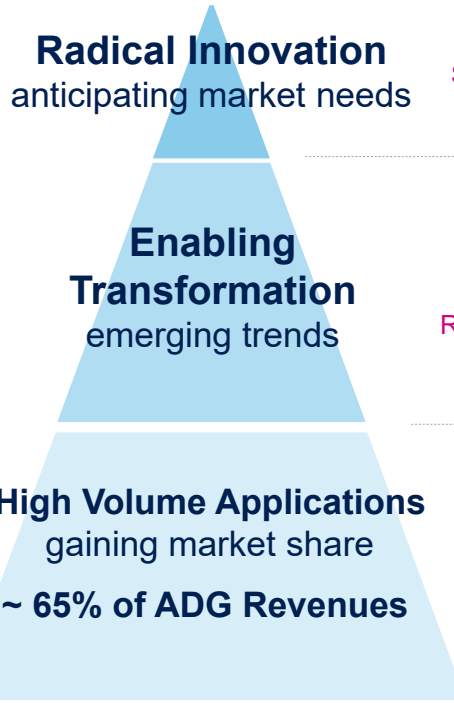

















Market Coverage

% of ADG Revenues



ADG: 2018 Product Coverage



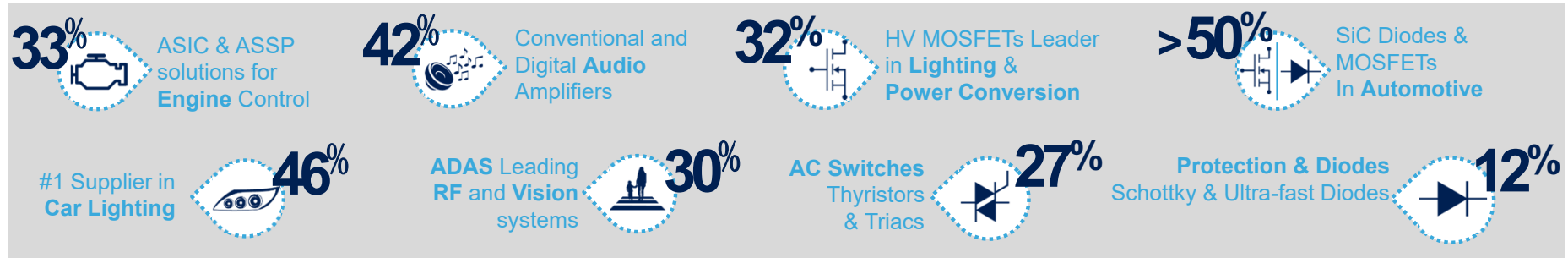
 Car Electrification SiC, GaN, IGBT, Modules, Galvanic Isolation, MCUs, Battery Management	 Autonomous Driving Level 4-5 ASICs Auto-parking ASICs	 Charging SiC, Diodes, IGBT, Modules	 5G Base Station GaN-RF
 ADAS Radar Rx/Tx, MCUs, Digital ASICs, Power Supply	 Car Connectivity Telematic Processors, GNSS, V2X	 48V System VIPower, LV MOSFETs, ASICs	 Automation SiC, IGBT, Modules
 ICE Engine MCUs, ASIC & ASSP	 Body MCUs, Door Control, Lighting	 Power Supply HV MOSFET, Diodes	 Mobile Phone Protection, Filters
 Passive Safety MCUs, Airbag & Braking ASSP	 Infotainment Amplifier, Tuners, Power Supply, Processors	 Conditioning SCR, IGBT, Modules	



2018 Double-Digit Growth Driven by Innovative Technologies

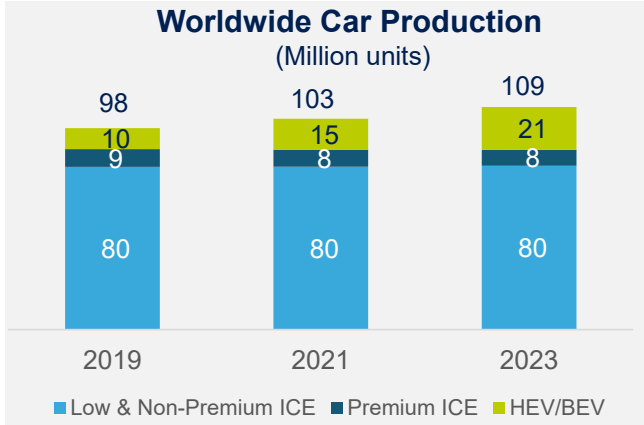
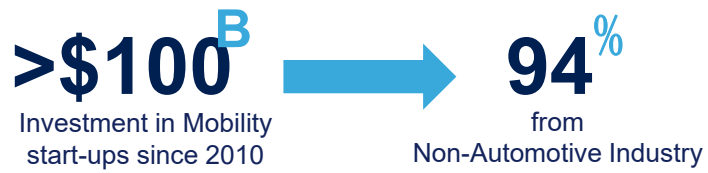
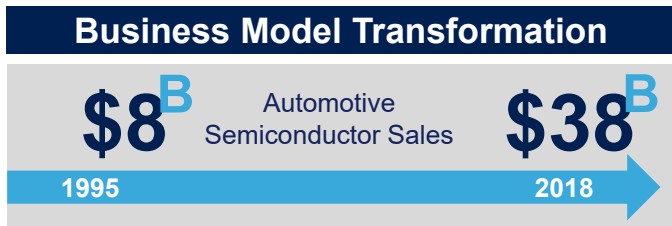
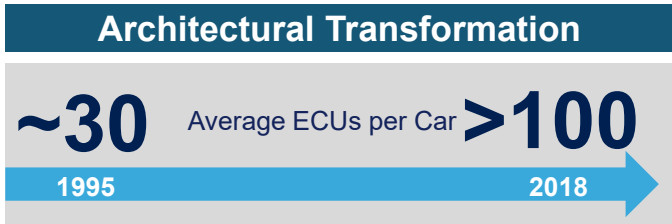
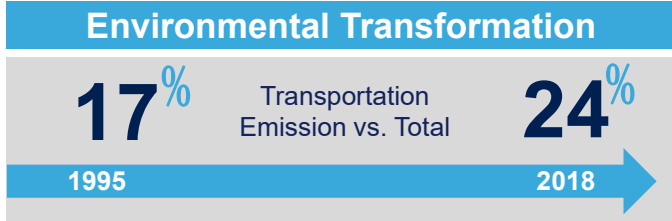
Automotive Product Sub-Group		Power Discrete Sub-Group			
>20% YoY Growth		Motor Control Electric Power Steering Power Distribution Lighting and Body	>25% YoY Growth		RF Power Solution Voltage Suppressor Integrated Filters
>30% YoY Growth		ADAS 32-bit Microcontroller Connectivity Premium Audio Amplifier	>35% YoY Growth		Low Voltage MOSFET IGBT SiC Power Modules

ST Market Share on some of our Multiple Leading positions:



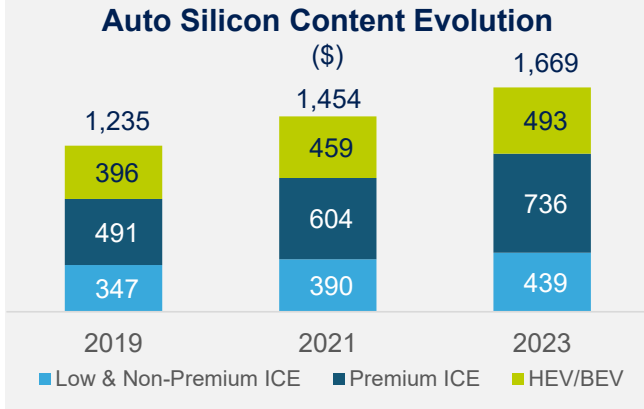
Source: Strategy Analytics, WSTS, IHS and ST Internal

Automotive Transformation



Content evolution driven by:

- Electrified car volumes (24% CAGR)
- ADAS (16% CAGR)



Source: Automotive news, McKinsey center of future mobility, Strategy Analytics, ST Internal

Automotive Smart Driving Megatrend Convergence

Electric Vehicles

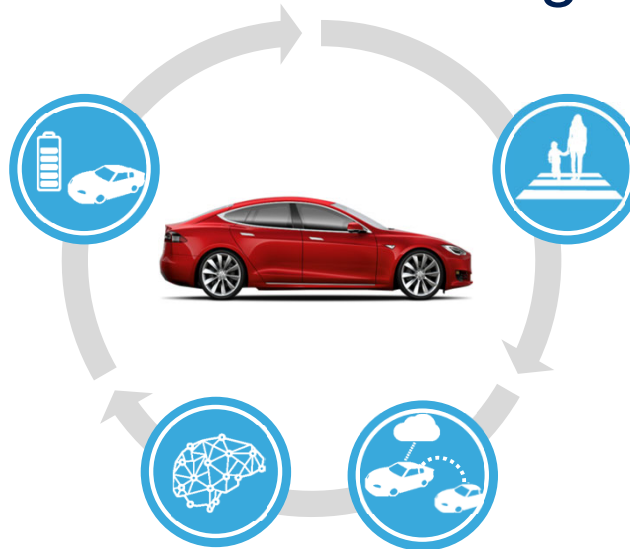
10cent/Km as mobility cost target

40% Electrified Vehicles by 2021

-35% CO2 by 2030

Zero Emission by 2040 in City
Zero Net Emission by 2050

Multiple vehicle configurations to support multiple mobility needs (Hybrid, Plug in, Electric, Fuel cells...)



Connected, Assisted, Autonomous

Zero accident risk by 2050

2050 mobility target: 90% of population vs. today 60% due to assisted vehicles

Supporting shared mobility by 2030 with one car in ten shared

Cheaper mobility proliferation with "Robo-taxis"

New Digital Architecture to Enable Software Reconfigurable vehicles

Data enabled services are estimated to provide ~30% of Car Makers revenues by 2030



Shared Mobility

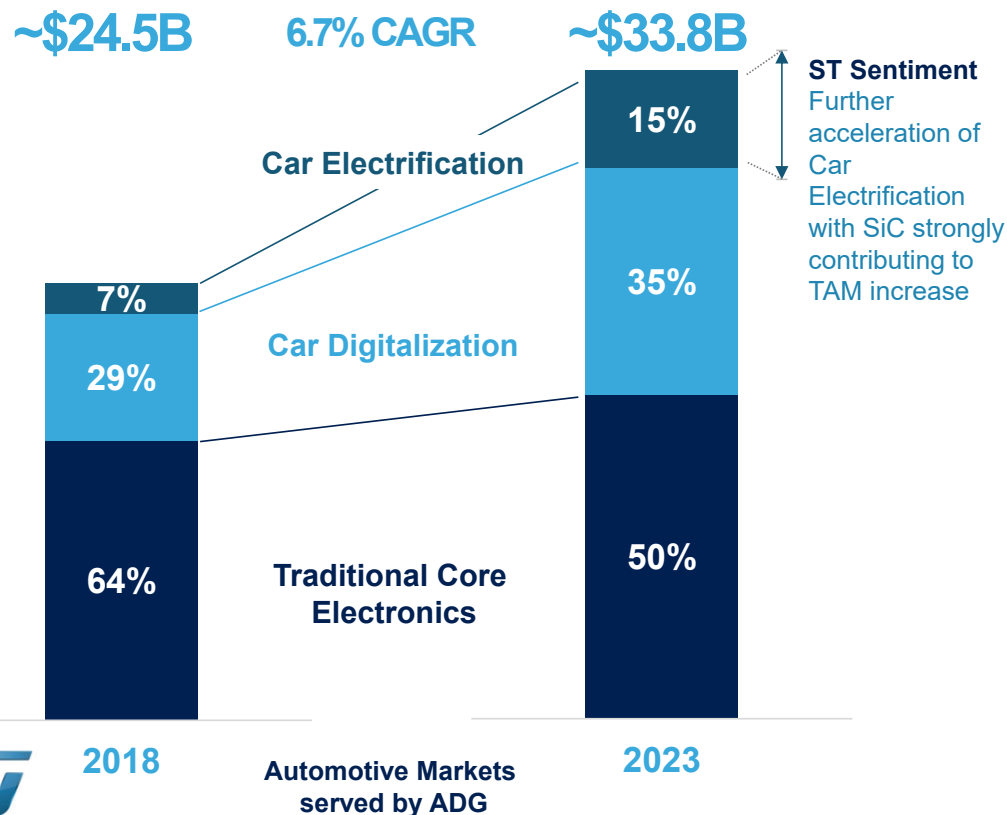


Data Enabled Services

Automotive Semiconductor Market Outlook

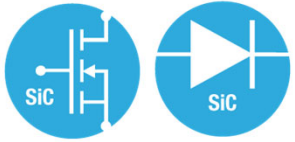
21

Market Value by Macro Trend



ADG Group Ambitions

- Build on leadership position in traditional core automotive electronics
- Exceed the market growth in car digitalization focusing on:
 - 32-bit new Arm® Microcontroller generation (Stellar)
 - ADAS (vision, radar) and automated parking solutions
 - Connectivity and Security
- **Continued leadership** in vehicle electrification with innovative automotive power solutions (Si, SiC, GaN) to outperform the market :
 - Leadership in high voltage power
 - Power module strategy including Si & SiC solutions



ST Silicon Carbide

Market Leadership and Supply Chain Excellence

22

Silicon Carbide: Exceeding our 2018 business targets

>\$100^M  **>\$200^M**
SiC WW Revenues in 2018 2019 Projection

#1 WW Automotive Supplier with SiC
Automotive Qualified Technology

Awards rate acceleration: More than **20 Car Makers** engaged



8 European Car-Makers
Multiple models with ramp-up from
2019-20 onwards



RENAULT NISSAN MITSUBISHI

ST teams are working with **Renault Nissan Mitsubishi Alliance** on several SiC FET/Diodes projects



life.augmented



HYUNDAI

Working with **Hyundai Kia Motor Company** on several **SiC** FET/Diodes projects

ST Strategy and Execution

SiC supply chain **vertical integration**
Norstel

ST acquired majority stake to secure an internal supply for SiC wafer substrates

Extended and **secured** supply chain capability through multi-year supply agreement with **Cree-Wolfspeed**

Keep expanding **6" Front-end** capacity in **ST Catania** plant with a second source planned

R&D execution: **Trench SiC** generation in qualification phase



Silicon Power Innovation

Electrification Opportunity Beyond Silicon Carbide

State-of-the-Art Battery Management up to 800V

Innovative cell monitoring architecture in cooperation with ~10 Chinese car makers and IMECAS as part of "China 2025" national program - Production start Q4 2019

Lithium cell monitoring



Devices per Vehicle



To support electro-mobility in China, targeting at least **Mid-teen** Share by 2021

Innovating on fast growing domains:

- **IGBT**: 2019 large projects ramping up with new Trench Technology - Projected ST CAGR '18-'23 > 30%
- **Module** business expanding at double digit YoY growth. ST innovating with expanding **ACEPACK™** product offer

>\$700^M
Module Business already secured

>60%
In Electric Vehicles

Solution for Mild-Hybrid vehicle (48V)

48V dedicated Low Voltage Power MOSFET

>\$100^M
Secured Business Awards

New VIPower™ intelligent power switches for Mild Hybrid vehicles:
48V Power Distribution and Motor Control
Targeting market leadership

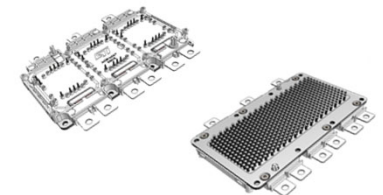


The main technology pillars for mid-term ST growth

12inch

Agrate activation to fulfill awarded volumes in power electronics

ACEPACK™ Family

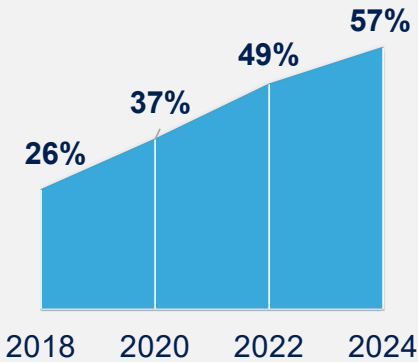


Active Safety and Autonomous Driving

Several Developments to Increase ST Silicon Content in ADAS Systems

ADAS Market Acceleration

ADAS System Penetration in Car Production

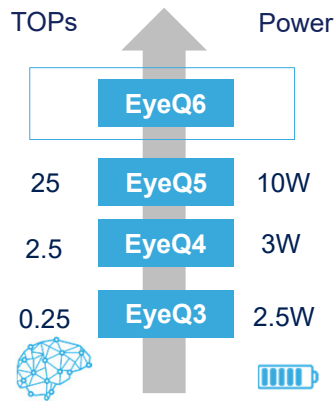


Average ADAS Content per Car

\$350 **\$900**



Leading Vision-based system with Mobileye



78[#]
2018 New Car Models Launched

32^M
EyeQ System delivered by Mobileye to WW OEMs

EyeQ5

- 1st product designed for automotive in 7 nm FinFET suitable for both ADAS and autonomous driving market
- Functional samples delivered to customer in Dec 2018
- High volume business already acquired with car makers

Moving forward to autonomous vehicle with Auto-parking ability



- Advanced solution for mobility and autonomous parking
- Co-development leveraging ST expertise in designing safe and secure automotive SoCs and Panasonic leadership in image manipulation and system design
- 16 nm technology samples delivered

Source: Strategy Analytics Automotive Electronics System Demand Forecast, ST Internal

Connecting Vehicles

From Wi-Fi-based V2X to Dual Mode Wi-Fi & 5G -V2X

Market 1st dual-mode V2X solution to enable multi-standard connectivity



Market success of the partnership

Autotalks solution awarded for mass-production:

- 4 of the top 10 automakers plan to deploy our V2X solution
- Over 10 Tier1s awarded the chipset
- Start of Production by 2020

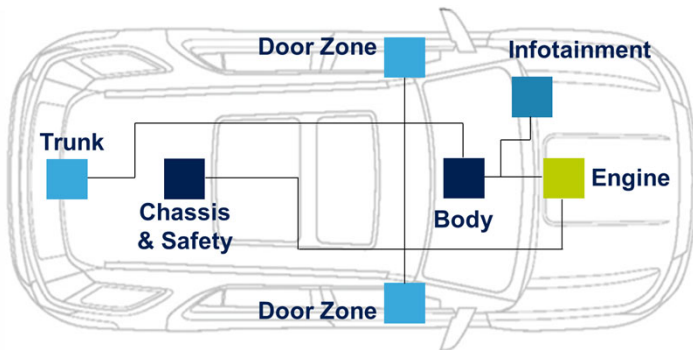


Car Digitalization: New Architectures

...Software Accounting for 30% of Vehicle Value by 2030

ST Technology enablers: FD-SOI 28nm with embedded Phase-Change Memory (PCM)

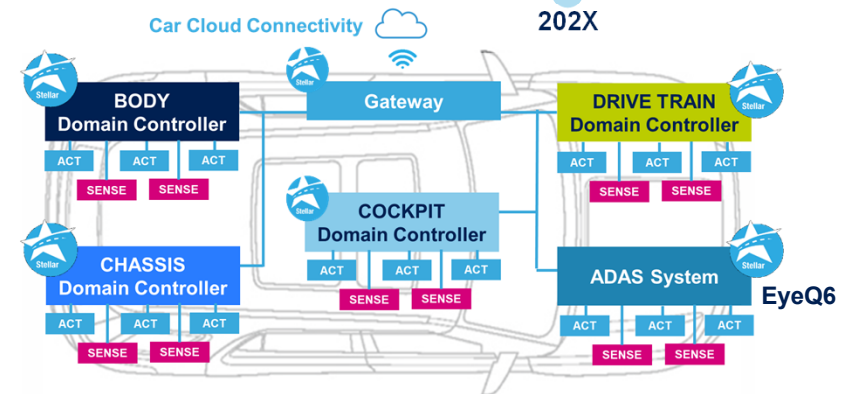
2017



x10

Car Computational Power

202X



Distributed Architecture: 9k DMIPs per Car

- Local Control Units with up to **130 ECUs/Car** (with 8-16-32-bit MCUs)
- Limited connectivity and in-vehicle data-flow (up to 10 Mbit/s)
- Heavy and expensive harness
- Extremely complex car Software management
- No car functionalities upgrade

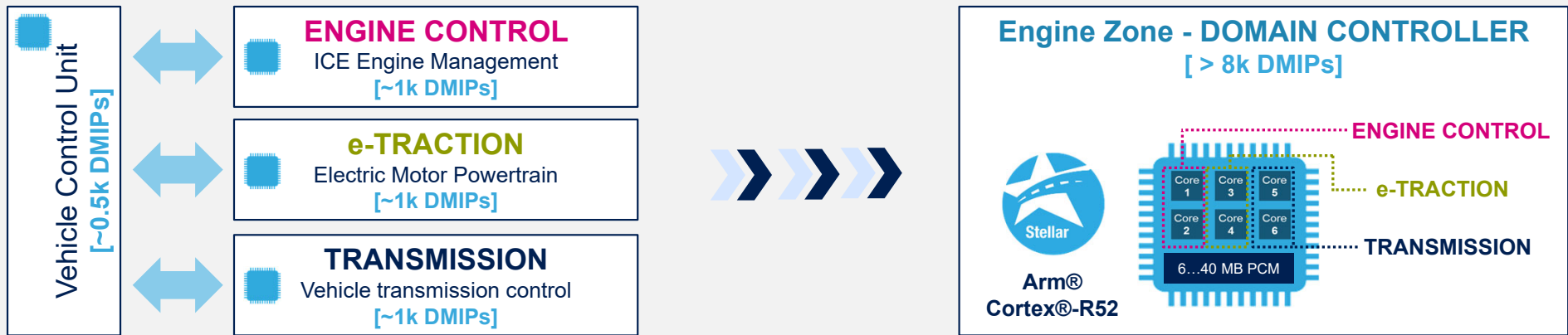
Integrated Real-time Domain Architecture: 90kDMIPs per Car

- ~5 Domain-Control Units with higher power computation
 - **Stellar** with multiple Arm® Cortex®-R52 cores embedded Phase-Change Memory (PCM)
- Autonomous Driving Super-computer (MPU ext. Memory) **~100 Trillion Operations per second**
- Architecture simplification, SW rationalization, harness drastic reduction
- Easy car functionality reconfiguration and SW upgrades
- High-speed in-vehicle communication
- Over-the-Air Software upgrade capability



...from ECUs to Domain Controllers

Example: Evolution for Vehicle Traction



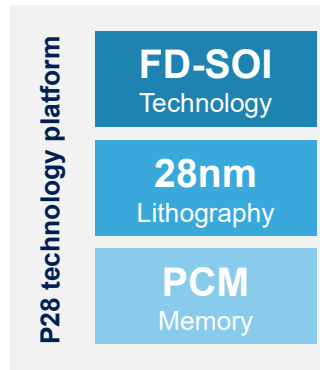
Requirements:

- High density technology
- Real-time
- Working Frequency > 400 MHz
- Low power consumption
- >16 MB of high speed access Non-Volatile Memory



Stellar: ST 28nm FD-SOI with embedded Phase-Change Memory

ST in-house production at Crolles 12"



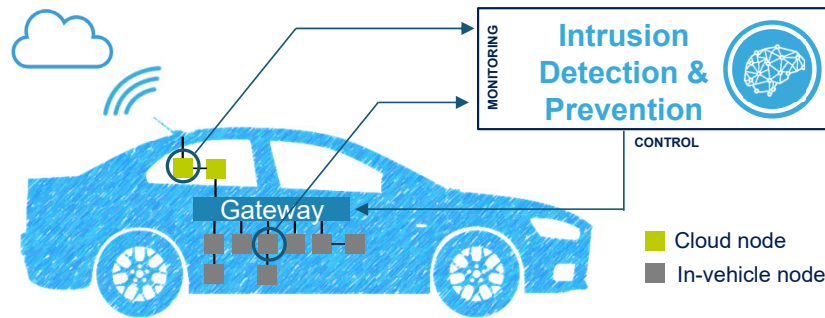
- ➔ Achieving Low Power Consumption requirement
- ➔ Supporting Higher working Frequency (> 600 MHz)
- ➔ ST Phase-Change Memory (High-Speed High-Density robust embedded NVM)



- Samples delivered to leading customers currently running in vehicle testbeds
- > 10 running programs

ST Security Solutions for Automotive

A comprehensive portfolio for Vehicle Security

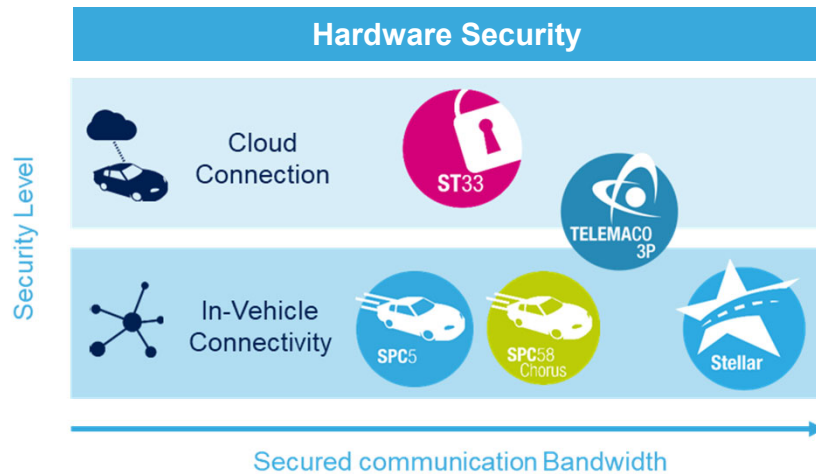


Artificial Intelligence and Neural Networks (NN) adopted for higher levels of security against cyber attacks

AI & NN Uses

- Learning about typical in-vehicle dataflows and big data exchange with the cloud
- Monitoring external connections and supervising internal node data-flow
- Recognizing potential malicious cyber attack and activate anti-intrusion strategy
- Early stage prevention on attack propagation

Adding Artificial Intelligence hardware acceleration to Stellar Family



Industrial Applications – A Solid Base

ST Leadership in Power Solutions

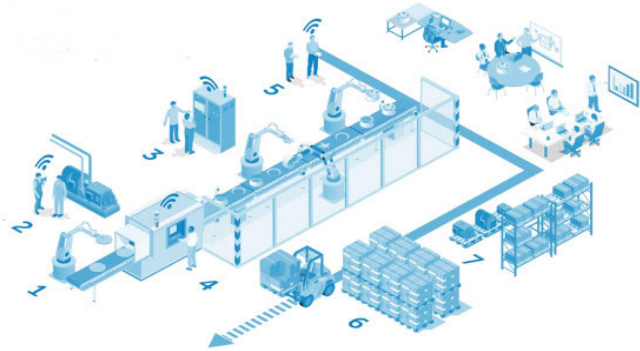
#2 In **INDUSTRIAL DISCRETE**



#1 **DISCRETE** supplier in many **INDUSTRIAL** application domains

- Power tools
- Medical Diagnostic
- Security & Surveillance
- Networking system
- Building Safety systems
-

SMART FACTORY



SMART HOME



Automation

>15% Share LV MOS in **High-End Industrial**

Energy Management

>30% HV MOS Super-junctions in **Lighting & Power conversion**

Motor Control

>10% Share IGBT & IPM in **Home Appliances**

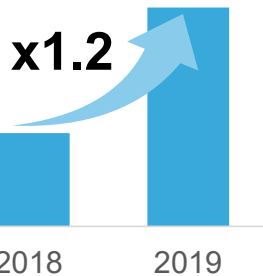


Source: IHS Industrial Semiconductor Market Tracker Q4 2018

Main Industrial Growth Drivers

Expanding ST Power Management leadership in **Server Farm** domain

ST Volume Fcst. [Mu]

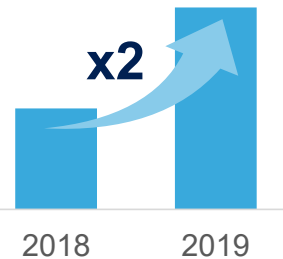


High Voltage Silicon MOSFETs **MDmesh™** and **SiC Rectifiers** leveraging **Increased demand of Cloud-based services** (5G as enabler)

>\$20
Power Silicon Value per Server/System

Doubling **Battery Based** Application business

ST Volume Fcst. [Mu]



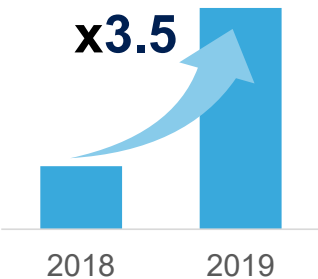
Low Voltage MOSFETs STRipFET™ F7 & new F8 introduction; **TVS Flat Package**

Forklift Trucks & Power Tools market (steady growth at +6% CAGR FY'18-'23)
Drones market (estimated \$100B in 2016-20)



Outperforming market in **Energy Industry**

ST Volume Fcst. [Mu]

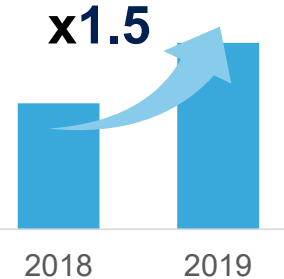


Flexible **ACEPACK™** Module with **IGBT, HV MOSFET & SiC** as well as **Ultrafast Rectifiers & High Voltage SCR** addressing Markets with competitive trade-off between integration, cost and unsurpassed efficiency

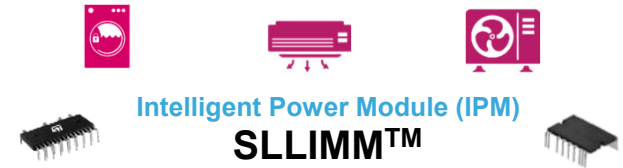


Achieving **Home Appliances** efficiency with ST Smart Solutions

ST Volume Fcst. [Mu]



Increase ST share in Air-Con, White goods domain and Brown Goods (Induction Heating) with IPM **SLLIMM™**, discrete **IGBT, Ultrafast Rectifiers & "H series" Triacs**



Intelligent Power Module (IPM) SLLIMM™
ST Granular offer with **~70 Part Numbers**



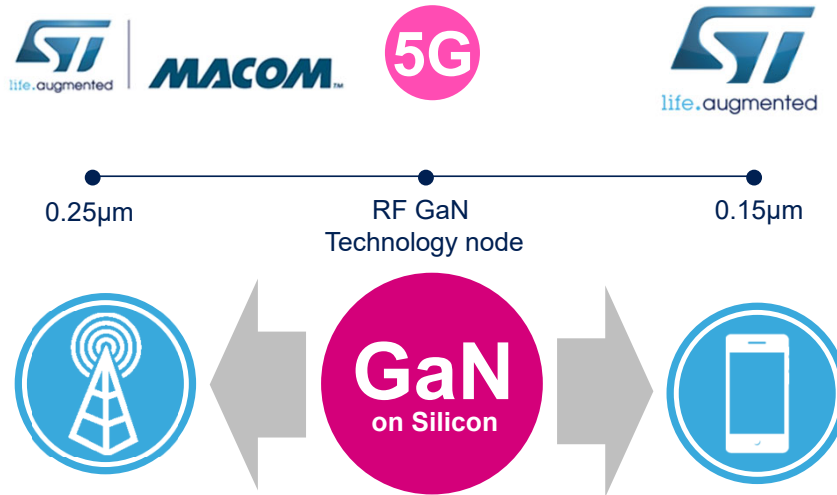
Market Boost Supporting 5G migration From Infrastructure to Personal Devices

Telecom Base Station

- Business Model: ST 8" technology development and manufacturing based on MACOM IP
- GaN on Silicon displacing LDMOS with significant cost advantage vs. competitor GaN on SiC solutions
- Engaged with major world wide market players
- Production Start: 2019. Volume ramp-up 2020

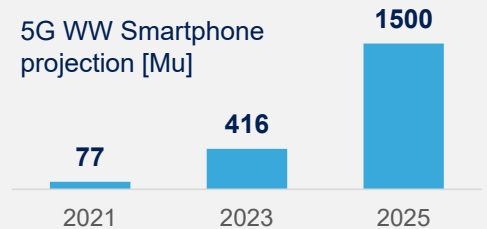
Targeting **>50%** Base Station Market Share

Capability to address **>80%** of 5G Demand



Mobile & Handset market

- ST licenses MACOM IP
- Targeting GaN on Silicon RF Power amplifiers for handset
- GaN on Silicon huge cost advantage vs traditional GaAs and competitors GaN on SiC grants an effective market penetration
- Engagements with market key players already initiated



2019

...scaling manufacturing capacity for these opportunities

2023

8 inch production
Supporting Production Volume for expected fast growth

Double Sourcing
Catania 8"+ Singapore 8" for flexibility and to support extra volume coming from Mobile



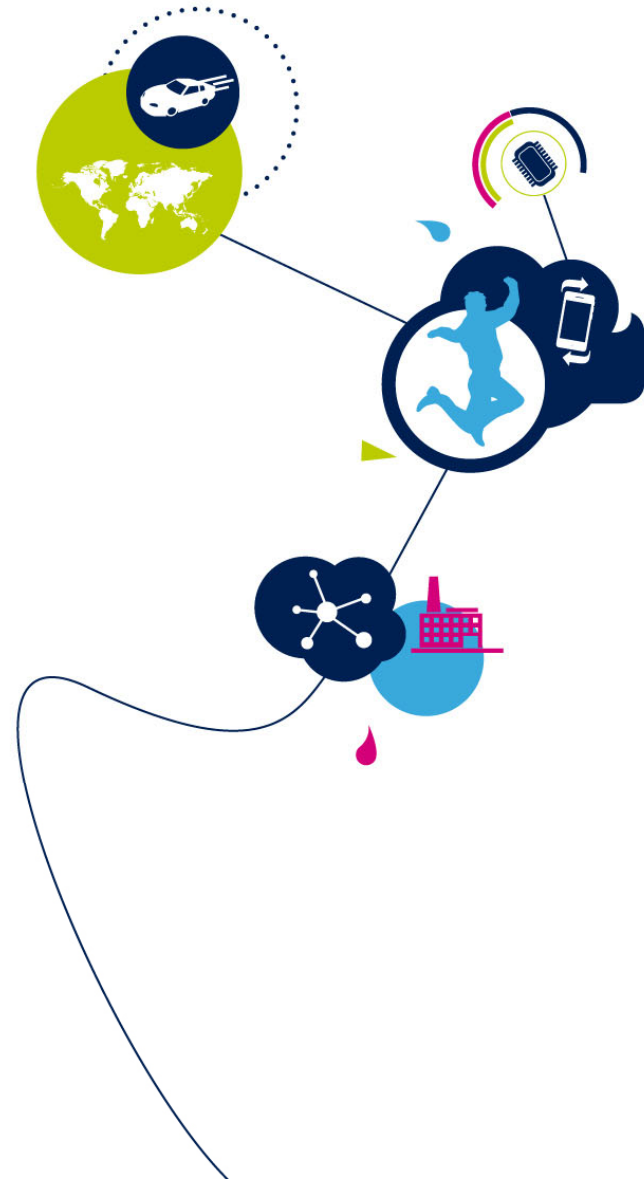
ADG is committed to outperform the market growth in Automotive and in Discrete application domains

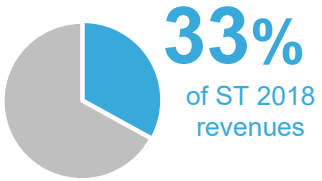
- ADG is ready to support the mobility transformation, seizing market opportunities coming from electrification, shared mobility, automotive commitment to zero incidents, connectivity and vehicle architecture shifts
- Technology innovation, supported by world-class manufacturing, remains a priority to support new automotive trends, with a strong focus on new power materials (wide bandgap) and digital applications (FD-SOI and Phase Change Memory)
- ADG supports the growth of the company in non-automotive domains with technology leadership and an extended partnership network focusing on the Industrial domains and 5G applications

Analog, MEMS & Sensors

Benedetto Vigna

President
Analog, MEMS and Sensors Group (AMS)

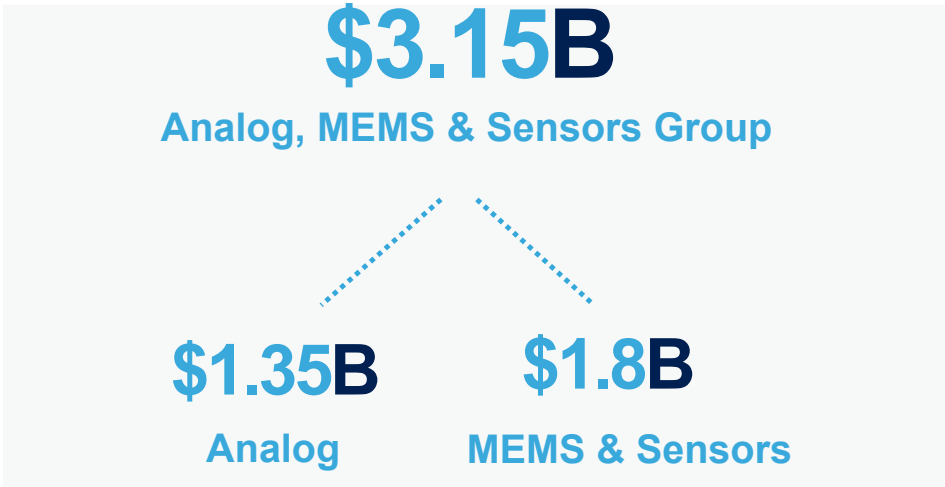




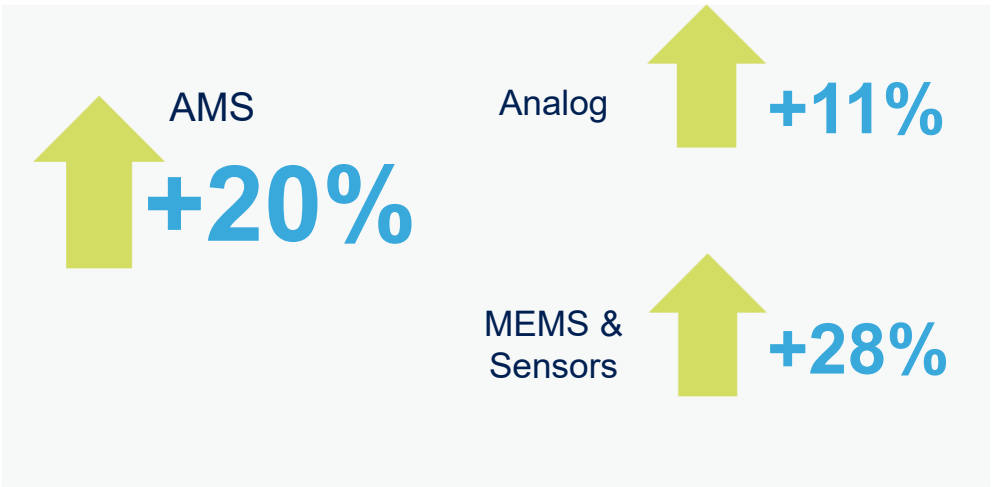
AMS Group at a Glance

Key Financial Data by Sub-Group

Group 2018 Revenue



FY18 vs FY17 Growth



A wide range and diversified product portfolio to support a large customers base

Serving more than **70,000** Customers



MEMS & Sensors

- MEMS Sensors & Actuators
- Specialized Imaging Sensors

Analog

- General Purpose
- Application Specific

- Strategic **focus** on Industrial & Automotive end markets
- Address specific large **opportunities** in Personal Electronics
- **Selective** approach in Communications Equipment & Infrastructure focusing on advanced power management

MEMS Sensors & Actuators

Technology Focus



Thin Film Piezoelectric PεTRA*

- Innovative piezoelectric materials
- Higher efficiency
- Lower cost



Microactuators
for Ink Jet printing,
Speakers &
Infrared Scanners

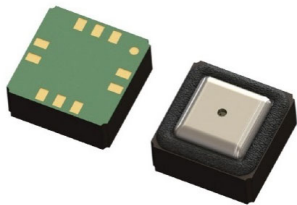


Next Generation ThELMA*

- Higher accuracy and reliability
- Ultra-low power
- More intelligence



Motion sensors for
Personal Electronics, Automotive
& Industrial



Next Generation BASTILLE*

- Higher accuracy
- Size reduction
- Waterproofing



Environmental sensors for Personal
Electronics & Industrial

*ST proprietary MEMS technologies.

MEMS Sensors

Higher Accuracy for Industrial & Automotive

Motion, Vibration, Angle Measurement



MEMS motion sensors
Accelerometers, gyroscopes, 6-axis IMUs, magnetometers

Temperature Monitoring & Calibration



Temperature sensors

Pressure Monitoring



Pressure sensors

Humidity Monitoring



Humidity sensors

Acoustic Monitoring



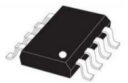
MEMS microphones
Analog, digital, top and bottom port solutions



Inclinometer



Hi-g accelerometers for airbags



Specialized Imaging Sensors

Technology Focus



Structured Light

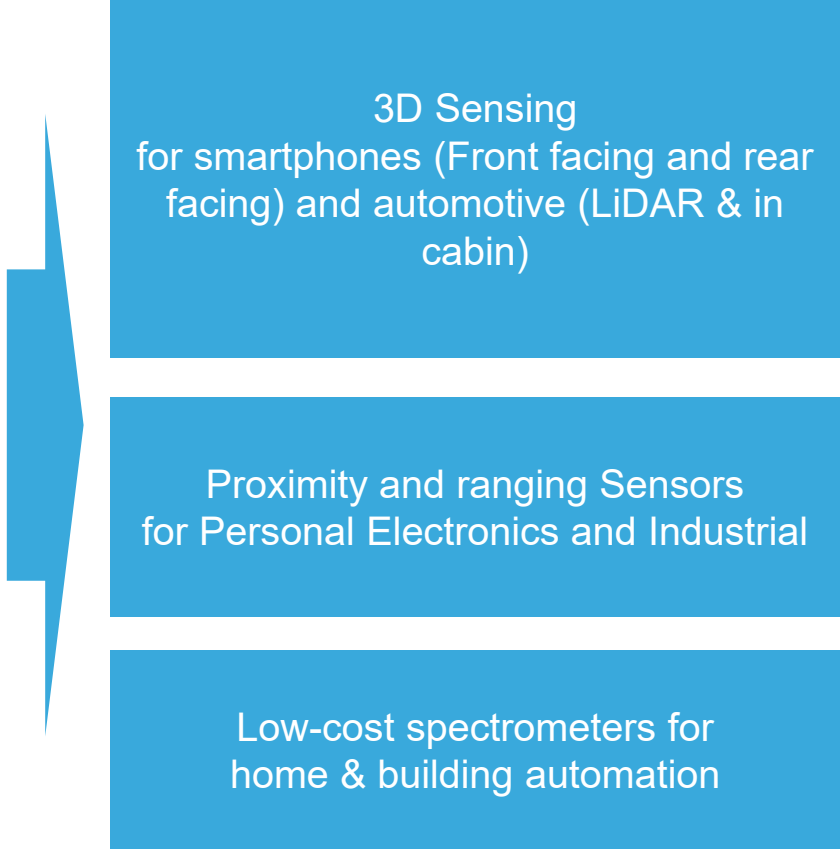
- Global Shutter
- High Quantum Efficiency
- 3D-BSI

Time of Flight (ToF)

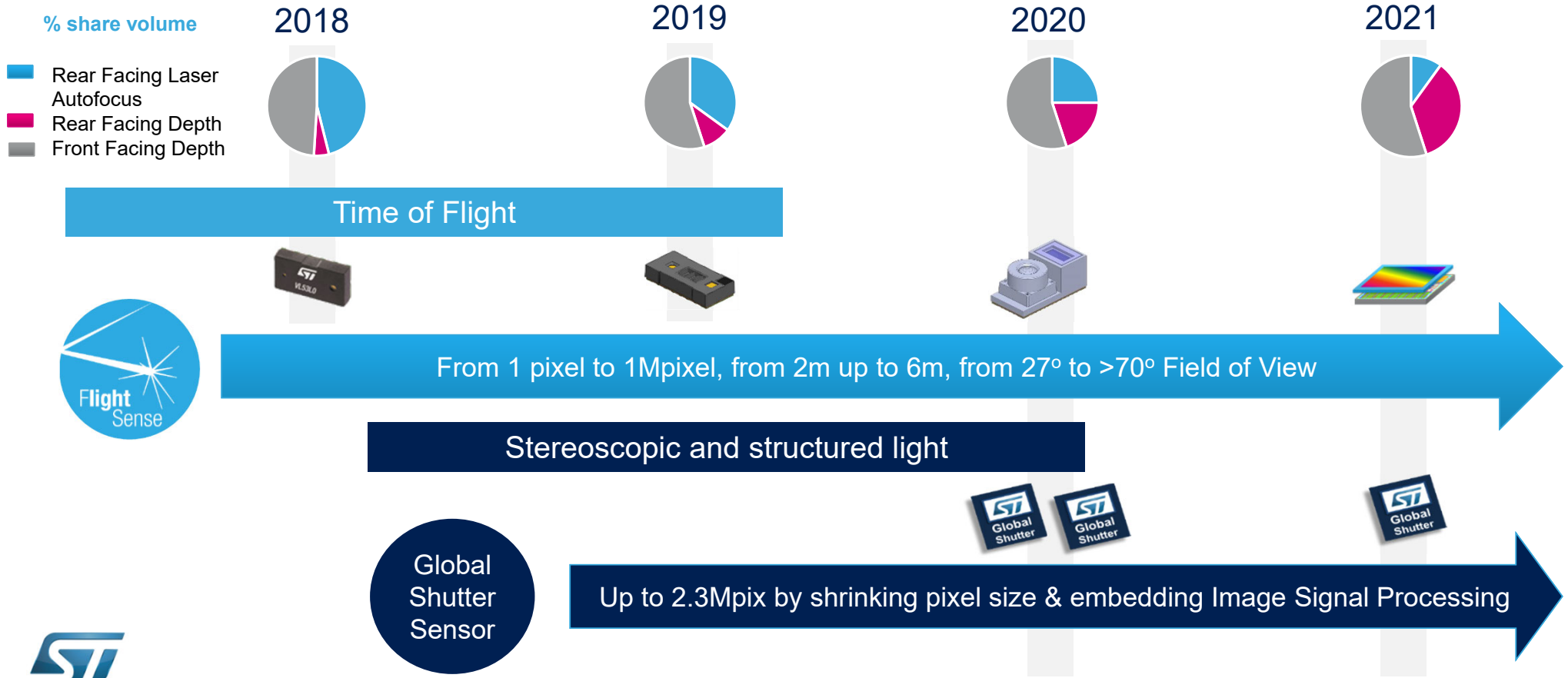
- Direct & indirect
- Increasing resolution
- All-in-one & low power
- Multi-zone & multi-object capability
- 3D-BSI, 40 nm SPAD

Ambient Light Sensor

- High sensitivity
- Small size & low power
- Flicker detection



Expanding our Imaging Sensing Offer



Diversifying our Imaging Offer for Automotive



Sensing & Viewing Camera

Rolling Shutter

- High Dynamic Range (HDR)
- Low Noise
- High Sensitivity
- FSI
- Flicker Free
- No Memory
- Low Noise
- High Sensitivity
- BSI



In-Cabin Optical Sense

Global Shutter

- HDR
- Low Noise
- High sharpness
- Multi-zone
- FSI

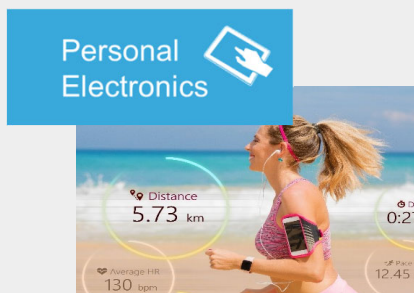
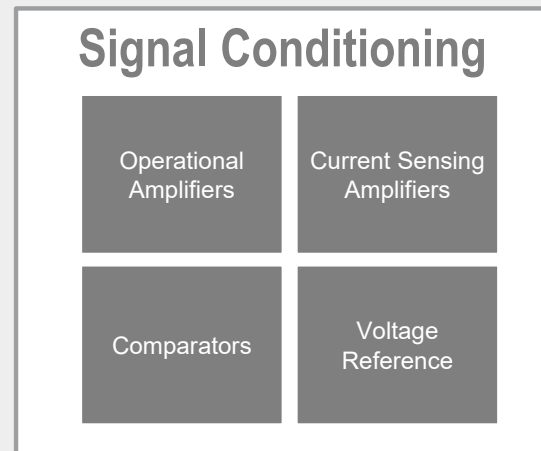
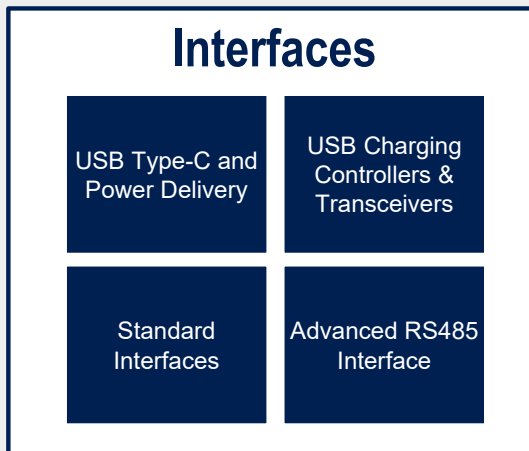
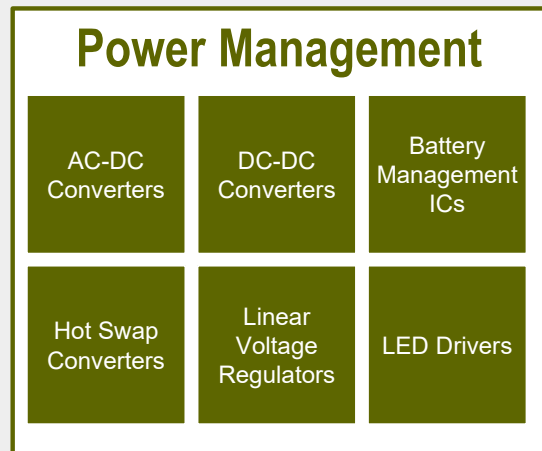


LiDAR

FlightSense™

- integrated SoC receiver solution
- 40 nm & 3D CMOS
- SPAD

Analog – General Purpose



Analog – Application Specific

Focus Areas

Motion Control



3D Printers



Industrial Drives



Pumps & Compressors

Automation



Factory



City



Home & Building

Energy Management



Power Management



Metering



Wireless Charging

Product Leadership

Motor Drivers



Intelligent Power Switches



Powerline Communication ICs



Leveraging
Technology & IP,
System knowhow,
Customer intimacy



Analog – Application Specific Smart Motor Control

Broad portfolio with more than **130** products and more than **One Billion** Units sold



Motor Driver ICs from 1.8 to 600 V

Extra-Miniaturized STSPIN2 Series	High-performance STSPIN8, L62 Series	High-Power /Voltage PWD SiP Series
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High Voltage Driver ICs + MOSFETs, IGBTs, SiC FETs

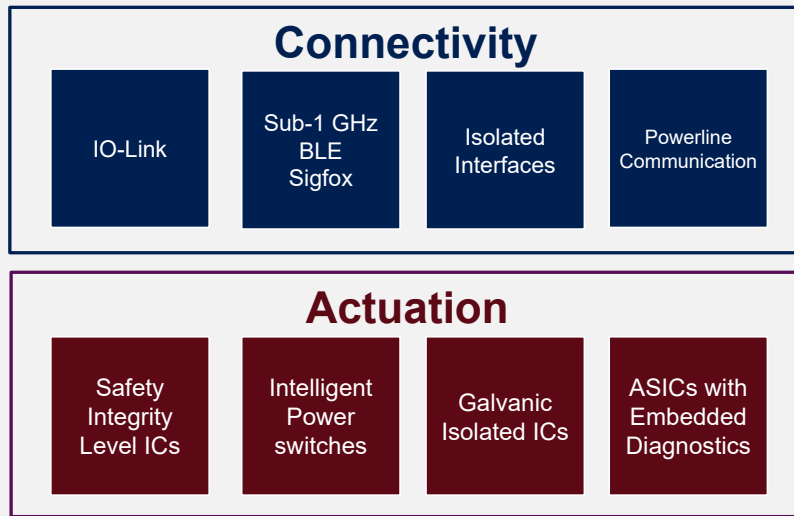
Half-Bridge L638, L639 Series	High-Current L649 Series	Galvanic Isolated STGAP Series
Motor drivers with embedded MCU: STSPIN32 Series		

Below 10 W	Up to 100 W	Up to 500 W	Up to 1 kW	Up to tens of kW
------------	-------------	-------------	------------	------------------



Based on **Advanced BCD** Technology

Analog – Application Specific Factory Automation



- Communication and **flexibility** to adapt in real-time to external events
- **Robustness** and reliability thanks to embedded intelligence and diagnostics
- Higher efficiency and **safety** at all points in power usage
- **Distributed** intelligence, decentralized diagnostics



Based on **BCD, BiCMOS, Galvanic Isolation**



Analog – Application Specific Power & Energy Management

45

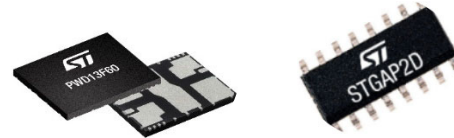
Smart Grid, Smart Metering & Smart Solar

- > 100 million meters in the field
- Powerline Communication technology leadership
- System knowhow and partnership with key players



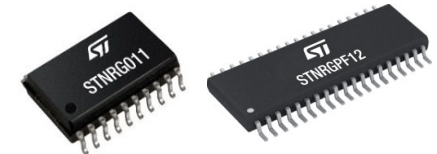
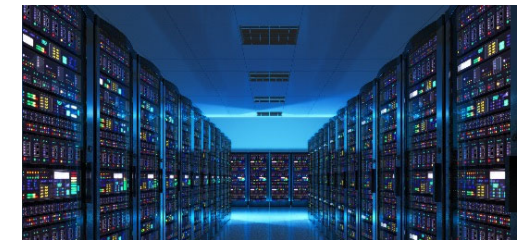
Advanced Drivers & System-in-Package

- Driving MOSFETs, IGBTs wide bandgap FETs
- Galvanic isolation for safety certification
- High voltage, high power-density, high speed



Power Management for Data Centers & 5G

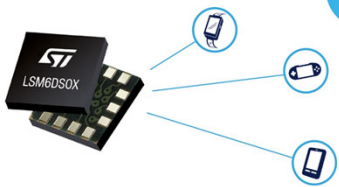
- Digital power control
- Galvanic isolation
- Advanced drivers & SiP for power actuation



MEMS & Sensors

MEMS

6-axis iNEMO™ IMU with Machine Learning Core



Specialized Imaging Sensors

World's smallest multispectral sensor RGB-UV-IR with Light Flicker engine



Analog

General Purpose

Off-line high-voltage converters for rugged and flexible 5-30V power supplies



Application Specific

Galvanic isolated smart power switch safety and robustness for Industry 4.0



A wide range and diversified product portfolio to support a large customers base

Serving more than **70,000** Customers

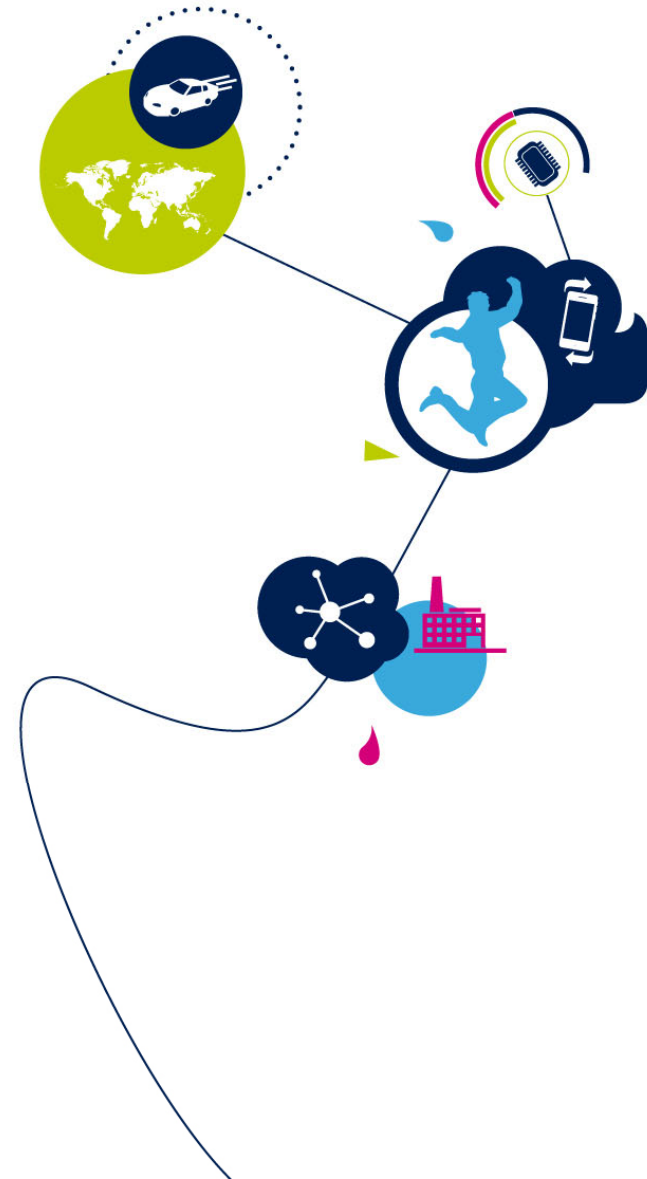


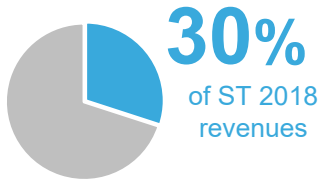
Microcontrollers & Digital ICs

Claude Dardanne

President

Microcontrollers & Digital ICs Group (MDG)





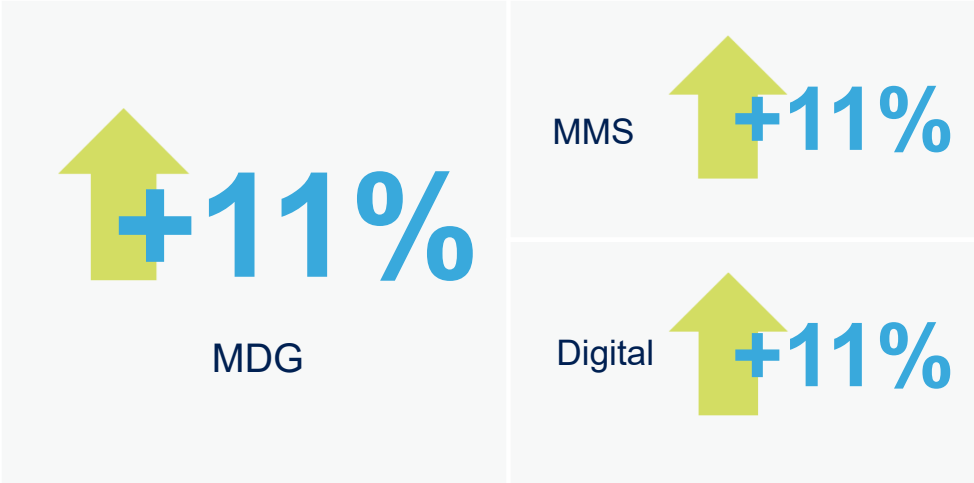
MDG Group at a Glance

Key Financial Data by Sub-Group

Group 2018 Revenue



FY18 vs FY17 Growth



MMS Microcontrollers & Memories
Digital Digital and Mixed ASICs, Aerospace,
Defense and mmW Communication



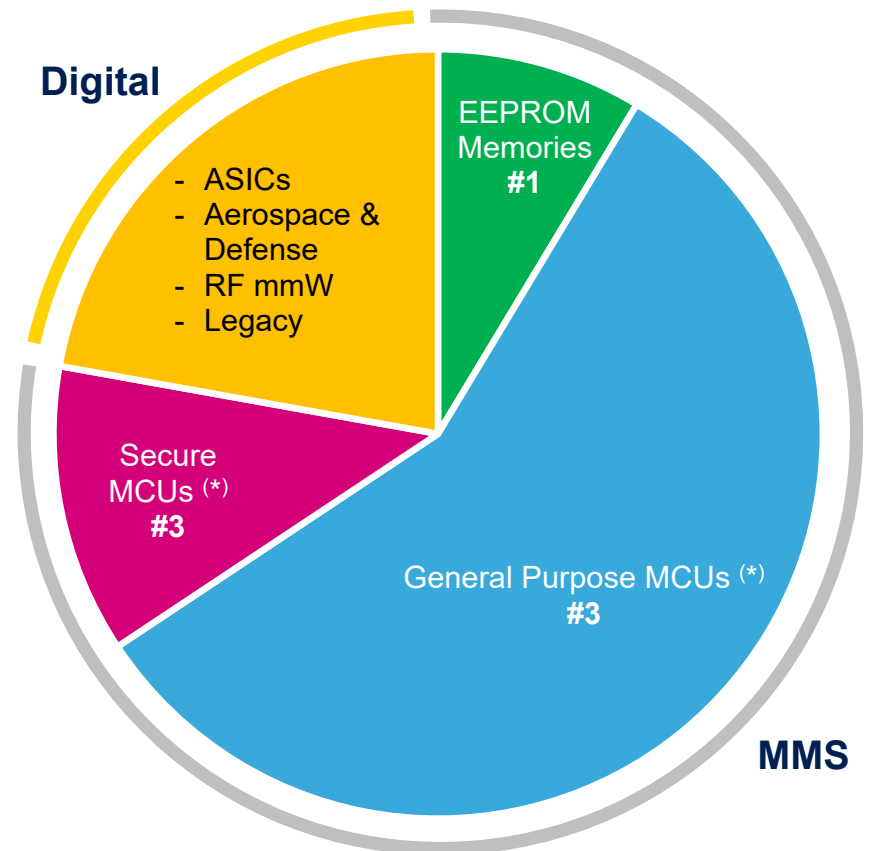
Microcontrollers & Digital Group

2018 revenues split

- ~ 70% Revenues with Microcontrollers (*)
- ~ 20% Revenues with Digital products
- ~ 10% Revenues with EEPROM memories

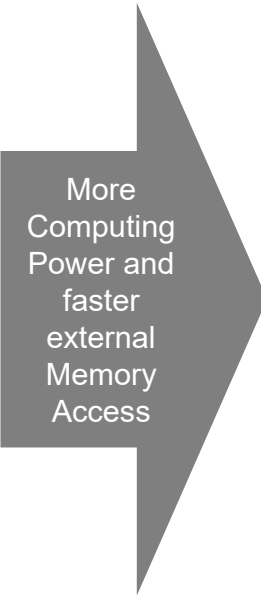
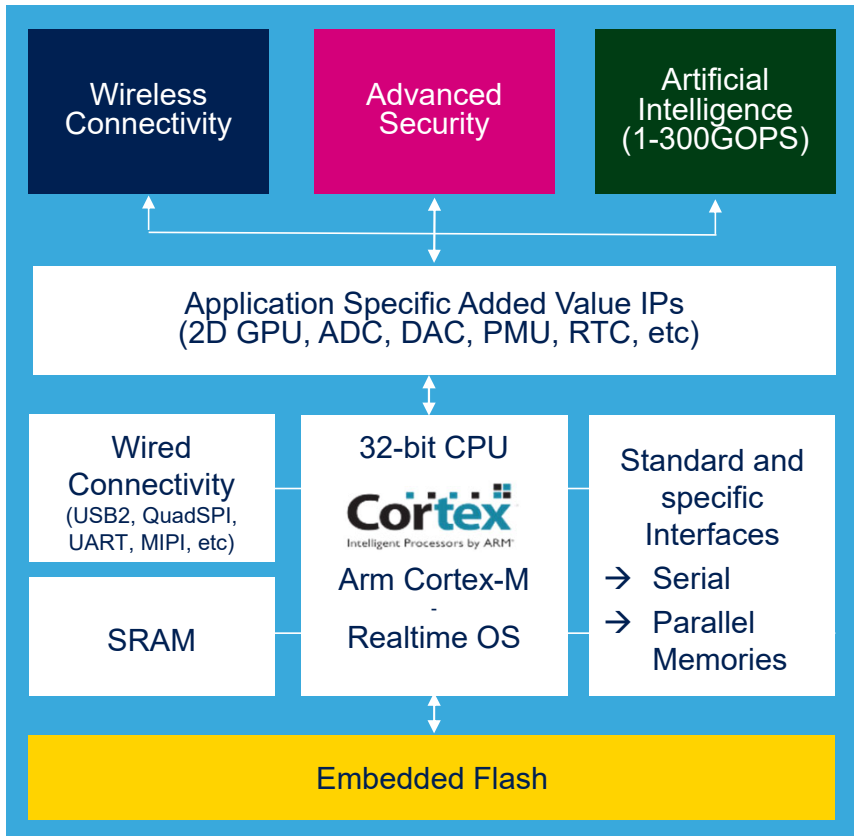
3 year target

- Leadership on Embedded Processing (*)
- Apply Digital competences to Industrial (MPU / AI) & RF mmW, capitalizing on ST differentiated technologies & IP
- Consolidate leadership in EEPROM Memories



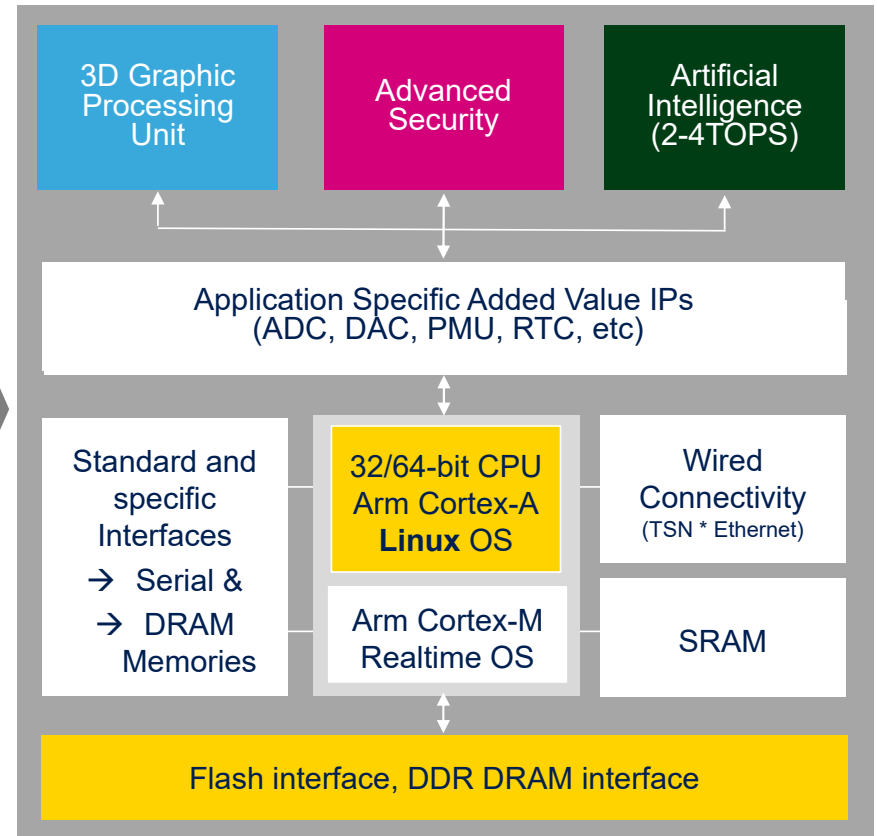
(*) General Purpose & Secure MCUs excluding automotive MCUs
2017 Ranking : source IHS Markit, March 2018

STM32 MCU



More Computing Power and faster external Memory Access

STM32 MPU



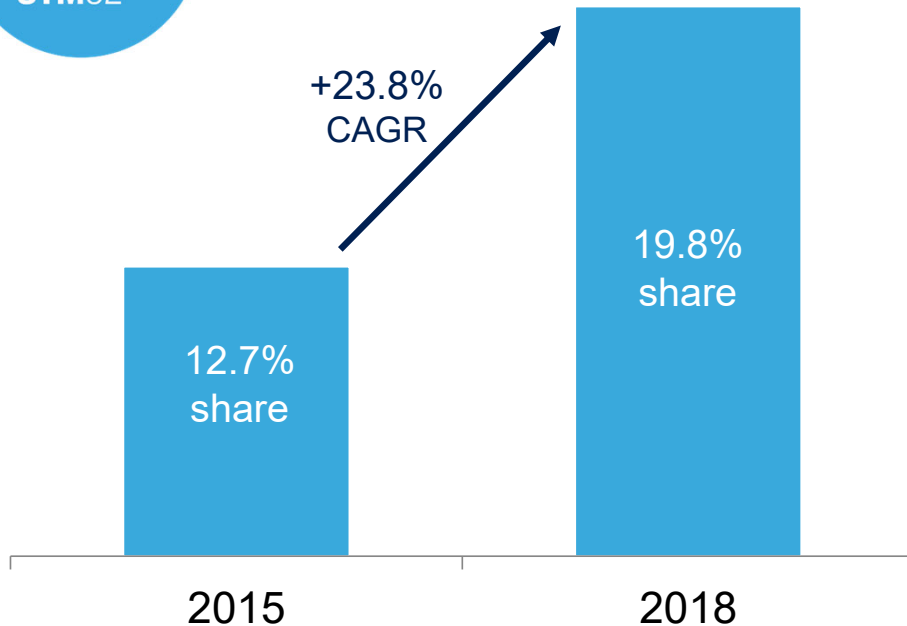
Expanded Ecosystem

STM32 Market Expansion

51



Business Trend STM32 Revenues



14 Product Series (>1000 Part Numbers)

Ultra Low Power MCU

Proliferation: L0, L1, L4

New: STM32L5 with secure Arm Cortex-M33 core

Mainstream MCU

Proliferation: F0, F1, F3

New: G0 entry level, G4 enhanced mixed signal

High Performance MCU

Proliferation: F2, F4, F7, H7

New: STM32MP1 microprocessor product

Wireless MCU

New: STM32WB BLE 5.0, Zigbee, Thread

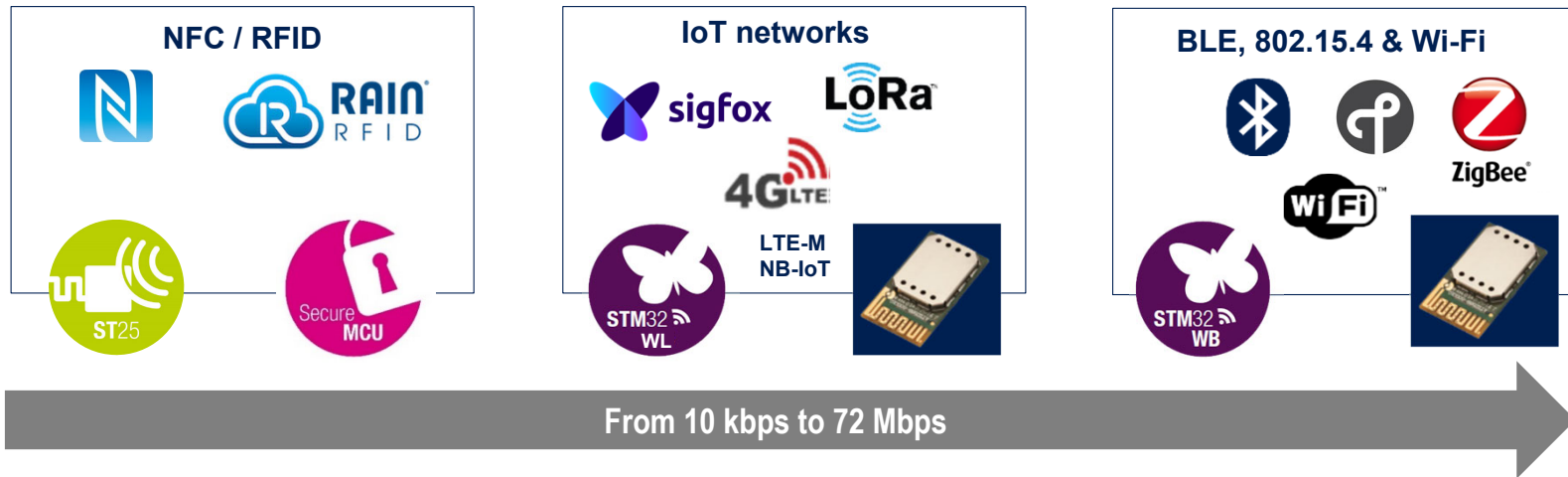
Enhanced ecosystem

Expanded STM32CubeMX

New : AI with STM32Cube.AI

STM32 Wireless Connectivity

From Near Field Communication to Cellular



Very short range secured

Industrial

- Logistics

Personal Electronics

- Mobile payment

Automotive

- Wireless charging
- Secure access

Low power long range networks

Industrial

- Remote monitoring
- Smart agriculture

Personal Electronics

- Direct cloud access

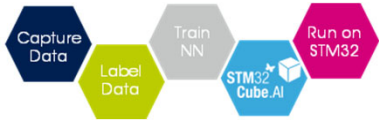
Ultra-low power Short-Medium range

Industrial

- Building automation
- Process automation

Personal Electronics

- Wearables
- Home connectivity



Artificial Intelligence on the STM32

An extensive SW toolbox to support easy creation of AI applications



STM32 Cube.AI framework for AI
map Neural Networks onto the STM32



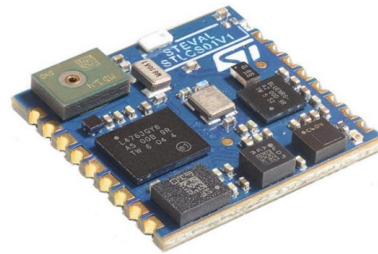
AI dedicated ST Partner Program
Neural Networks engineering services



Function packs quick prototyping



Audio & motion analysis
Character recognition
Image classification



STM32 Online Community
Dedicated community for Neural Network applications

















www.st.com/STM32CubeAI



Making everything secure

STM32 Security

A Scalable Offer

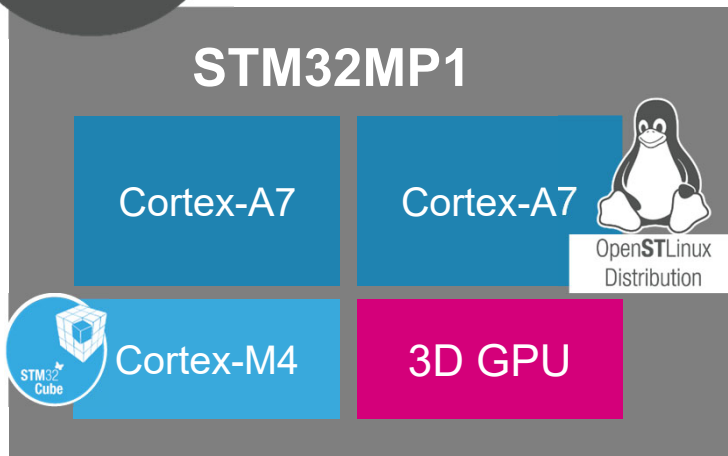
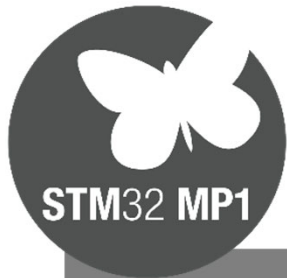
<p>Highest</p>     <p>Basic</p>	 <p>Secure MCU ST31/33 ST53/54</p>	 <p>Application Specific Security</p>
	  <p>STM32 MCU STSAFE secure element</p>	 <p>Secure Authentication Secure boot & Security services</p>
	 <p>STM32 with Trust Zone L5 with Cortex-M33</p>	 <p>Secure execution Code/Data isolation</p>
	 <p>STM32 with Crypto Engine F2/F4/F7/H7 L4/L4+/L5</p>	 <p>Secure connectivity SW Protection</p>
	 <p>STM32 with Memory Protection F1-F7/ L0-L4</p>	<p>SW & memory protection</p>



Several security features available across all products: unique ID, tamper detection, write & integrity memory protection

STM32MP1 General Purpose MPU

Accelerating IoT and Smart Industry Innovation



Target markets



- Multicore Microprocessor running RTOS & Linux in parallel
- Suitable for industrial applications with 10-year longevity commitment
- Heterogeneous architecture (2xMPU+MCU+GPU Cores)
- STM32Cube full ecosystem reuse on Arm Cortex-M4 core
- Dual Cortex-A7 with free Linux Distribution: [OpenSTLinux](#)

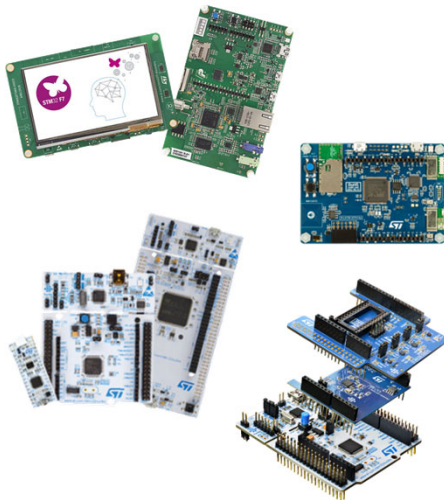


Expanding the STM32 Ecosystem

Enabling more than 60,000 Customers



Flexible Prototyping



SW Development Tools

- Code generators
- Debug tools
- Online design tools
- Prototyping software
- Simulation & analysis tools
- Artificial intelligence STM32 Cube.AI
- IDE Development environments

TrueSTUDIO[®] for STM32



SW Building Blocks

- Embedded OS
- Communication
- Sensors & actuators
- Audio processing
- Security
- Cloud connection
- Graphics

| TouchGFX

Certified Security Solutions



Banking & ID

Hardware & Solutions for
**Banking, ID, PayTV,
Transport**

- ST31
- STPay
- ST53

Wearables

**Mobile Security
Consumer**

Hardware & Solutions for
**Mobile Transactions
(Consumer)**

- ST33 eSIM, eSE
- ST21NFC
- ST54



Authentication

Solutions for
**Brand Protection, Computer,
IoT**

- STSAFE-A
- STSAFE-J
- STSAFE-TPM
- Custom

Industrial

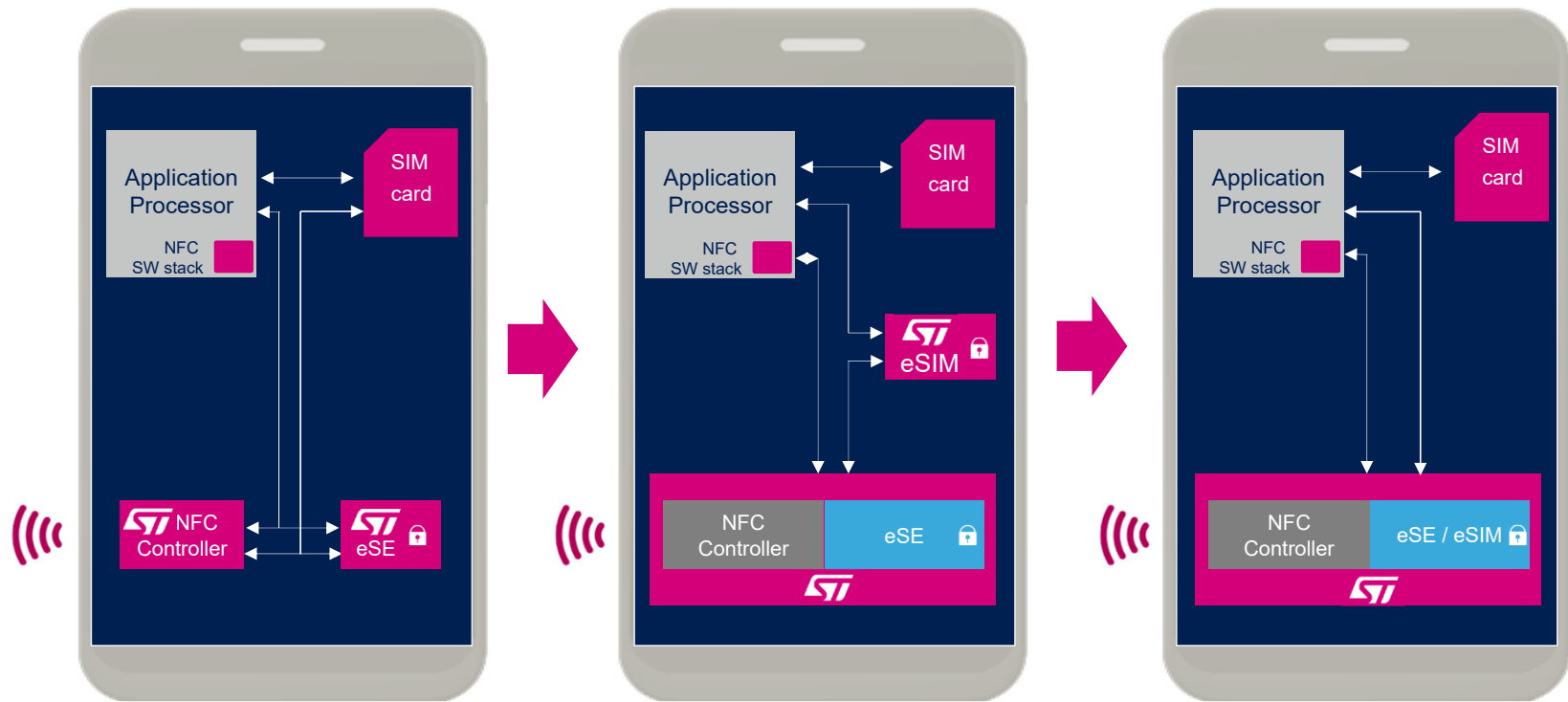
M2M & Auto

Hardware & Solutions for
**M2M
Automotive eSIM & eSE**

- ST32H-E/I, ST32-M
- ST33-M
- ST33-A
- Incard Solution

Mobile Security Solutions

- Volume pervasion for ST eSIM secure solutions
- Deployment of ST Secure Element + NFC controller SoC solution
- Further integration through NFC / eSE / eSIM convergence into a single die





Short-range Connectivity

NFC RF EEPROM Portfolio

Consumer engagement, Asset tracking, Ticketing, Gaming, Brand protection...

Tags



ST25T

Industrial, Lighting, Consumer, Metering, Appliance, Healthcare, ...

Dynamic tags



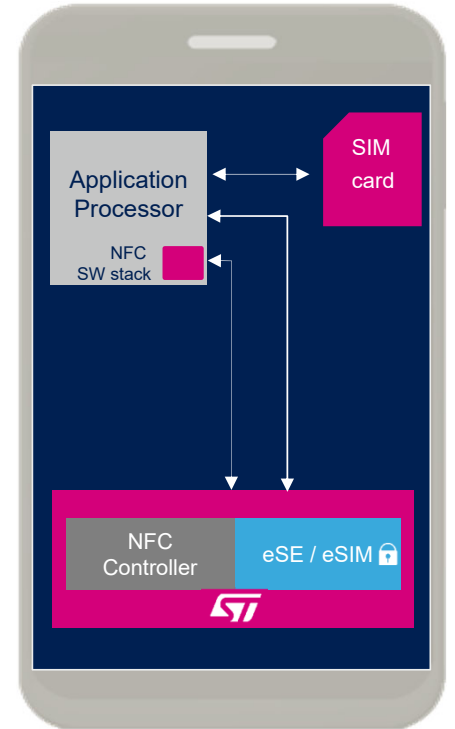
STM32 microcontroller ↔ I2C ↔ ST25D

POS & mPOS Terminals, Automotive, Access control, Gaming, ...

Readers



STM32 microcontroller ↔ SPI ↔ ST25R






Short Range Connectivity

60 GHz RF Transceiver


High-speed, low-power wireless link for close proximity data transmission

- Industrial
- Computer & Peripherals
- Personal Electronics

Robust contactless connectors for industrial applications



Smart connector-less Docking stations



ST60-A2

6 Gbps

SLVS

ST60-A3

6 Gbps
Full Duplex

USB-C, DisplayPort


- Very low power solution: power budget of **40 mW**
- Miniature form factor with **optimized BoM**

ST60-A4


10 Gbps
Full Duplex

USB-C, DP, etc...

Connector-less devices



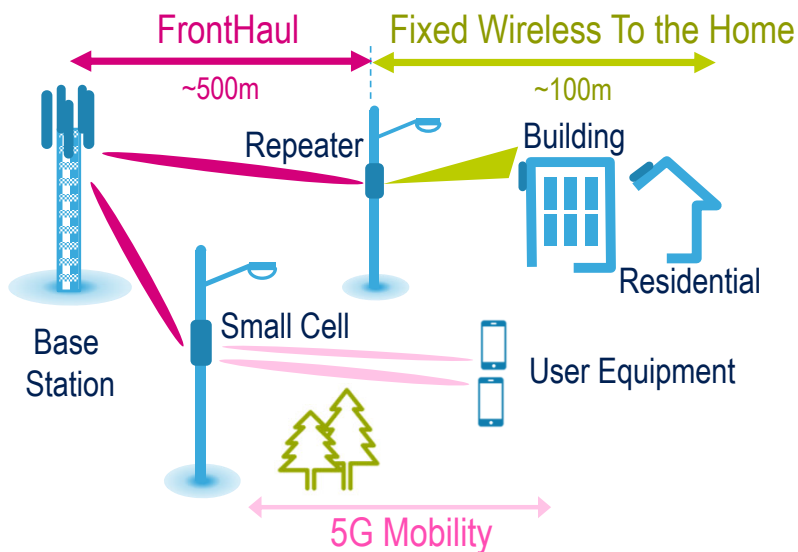
Board-to-board flex-less connection





The 5G Disruption

5G mmW Network Infrastructure



- Very high data rate – **x100***
- Reduced latency – **5 times lower***
- Very high reliability – **99.999%**
- Connections of **billions** of nodes
- Improved coverage

* vs 4G

- **New architecture** with denser network (small cells)
- **New technologies:** Advanced beam forming, massive MiMo
- **New spectrum:** Use of millimeter waves

ST Strengths

Wide range of **RF technology** solutions

BiCMOS, CMOS, FD-SOI, RF-SOI

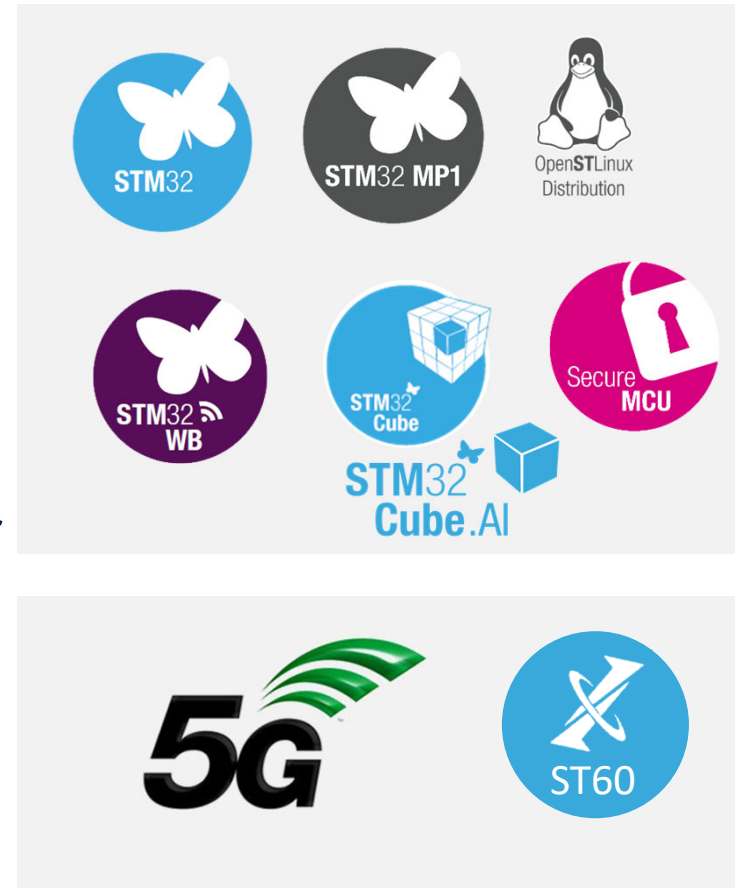
High performance **mmW RF solutions** for 10+ years

RF Transceiver products up to 60 GHz

Pioneered **beamforming solutions** for Satcom market

RF Front-end (PA, LNA), Transceiver & Beamforming products

- Assets to further improve leadership position in Embedded Processing
 - More Computing power
 - More Connectivity
 - More Security
 - More AI capabilities
 - Advanced Ecosystem
- Focus on Industrial market as a key growth driver
- Assets to enter the mmW & 5G markets
 - Adapted technology solutions
 - High performance RF transceiver product
 - Beamforming solutions



Questions & Answers



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