



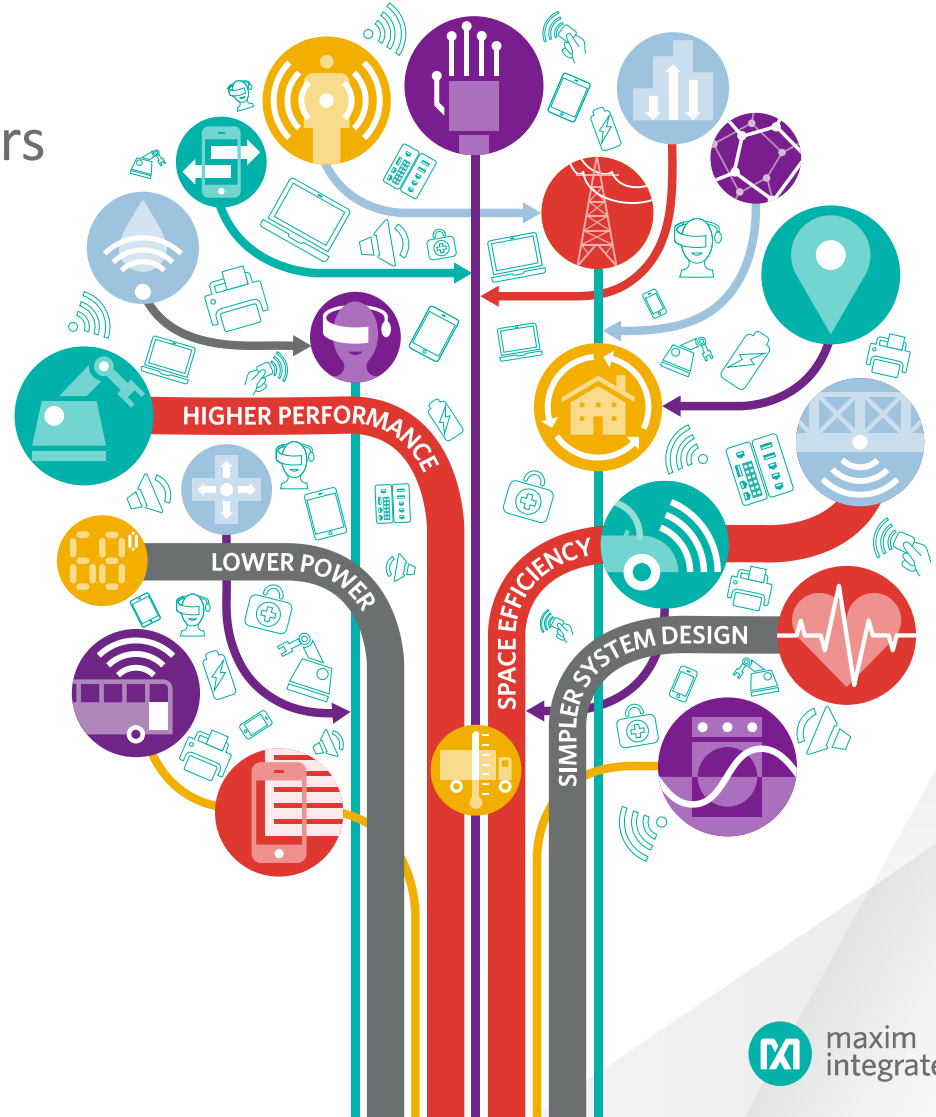
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# Maxim Integrated Overview

Automotive

# Converging on Analog Integration

- Integration beyond mobility
- Broaden markets & customers
- Committed to growth



# Accelerating Automotive

## Infotainment

- Sensors
- USB Charging
- Power
- LCD Backlight
- GMSL for Display
- GPS Tuner
- Active Antenna
- Hybrid Radio

## Powertrain

- Battery Mgmt (EV/Hybrids)
- High-Performance Analog
- Integrated Power

## Safety

- HD Camera Interface (GMSL)
- LED Lighting

## Access/Body

- Smart Key
- Remote Keyless Entry
- Instrument Cluster
- LED Lighting

# High-Performance Analog

To enable ECUs of the future

Clean



Electric Drive Train

Conscious



Safety & Driver Assist

Connected



Infotainment &  
Smart Key

# Automobile Technologies

High-Performance Analog, Lower System Cost, Automotive Grade

LEDs



Info: USB



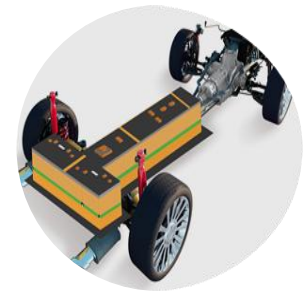
Hybrid Radio



Active Antenna



Powertrain



Display Lighting



Info: Power



Cameras



Smart Keys



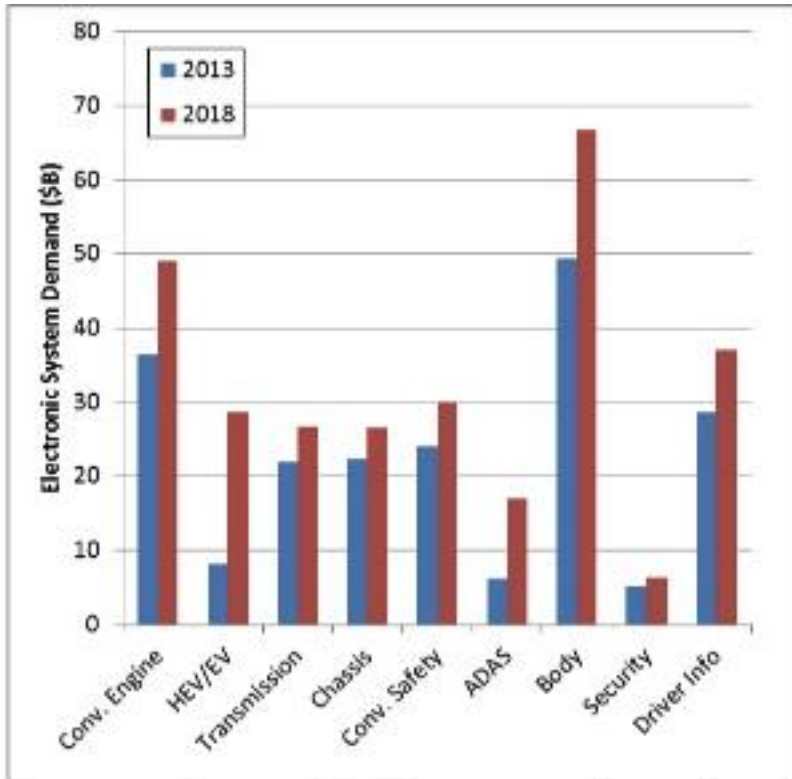
Sensors



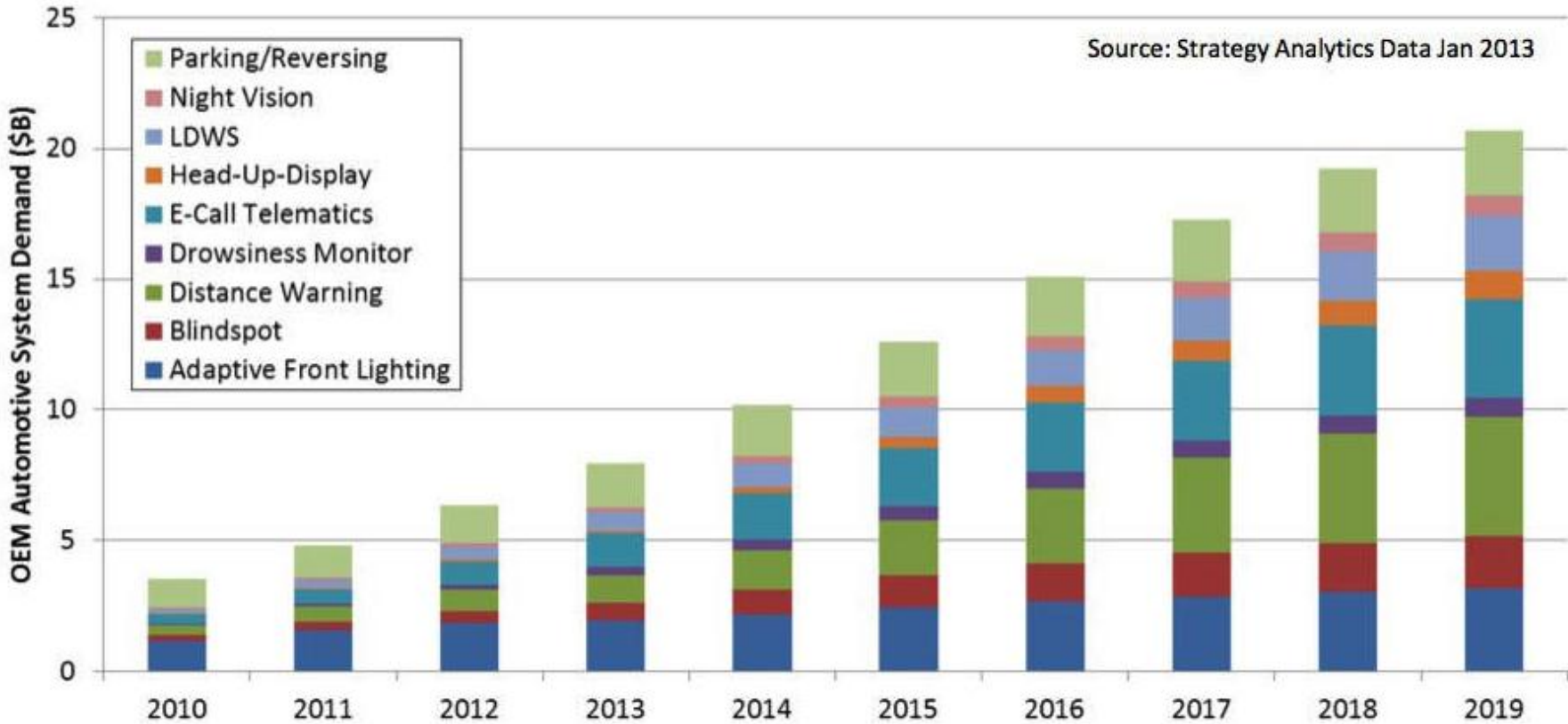
# Analog Integration in Automotive



# Two Strongest Growth Areas: ADAS and HEV/EV



# ADAS Demand – System Level



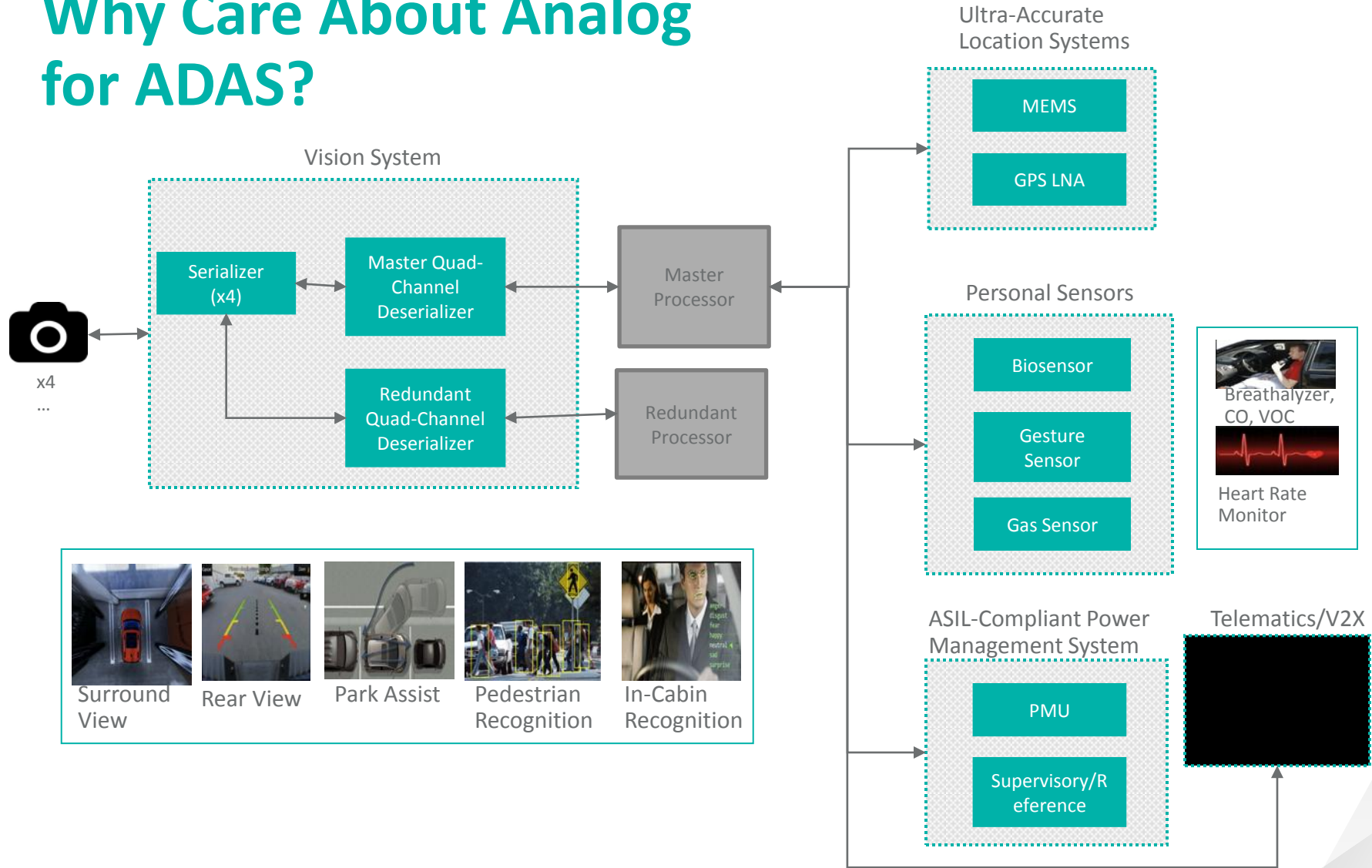
- Parking and lighting systems ~63% of the market in 2010
- Down to 27% by 2019 as other systems see faster growth



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# Developing Best-in-Class High-Performance Analog for ADAS Systems

# Why Care About Analog for ADAS?



High-performance analog is required to meet the needs of the ADAS system, irrespective of complexity of digital block used for data processing.

# Why Maxim in ADAS?

## Focus on Safety

- Redundant circuitry to meet ASIL requirements
- Diagnostics enabled in HW to offload processor for other critical functions

## Focus on Partner Ecosystem

- Partner reference design platforms available: schematic reviewed; SW compatible
- Roadmap alignment with ecosystem partners to meet future requirements

## Focus on Performance

- Ultra-fast (up to 6Gbps in future parts), low-latency video transmission for advanced vision systems
- Power management integration expertise
- Low-quiescent current, quiet EMI, small solution size capability



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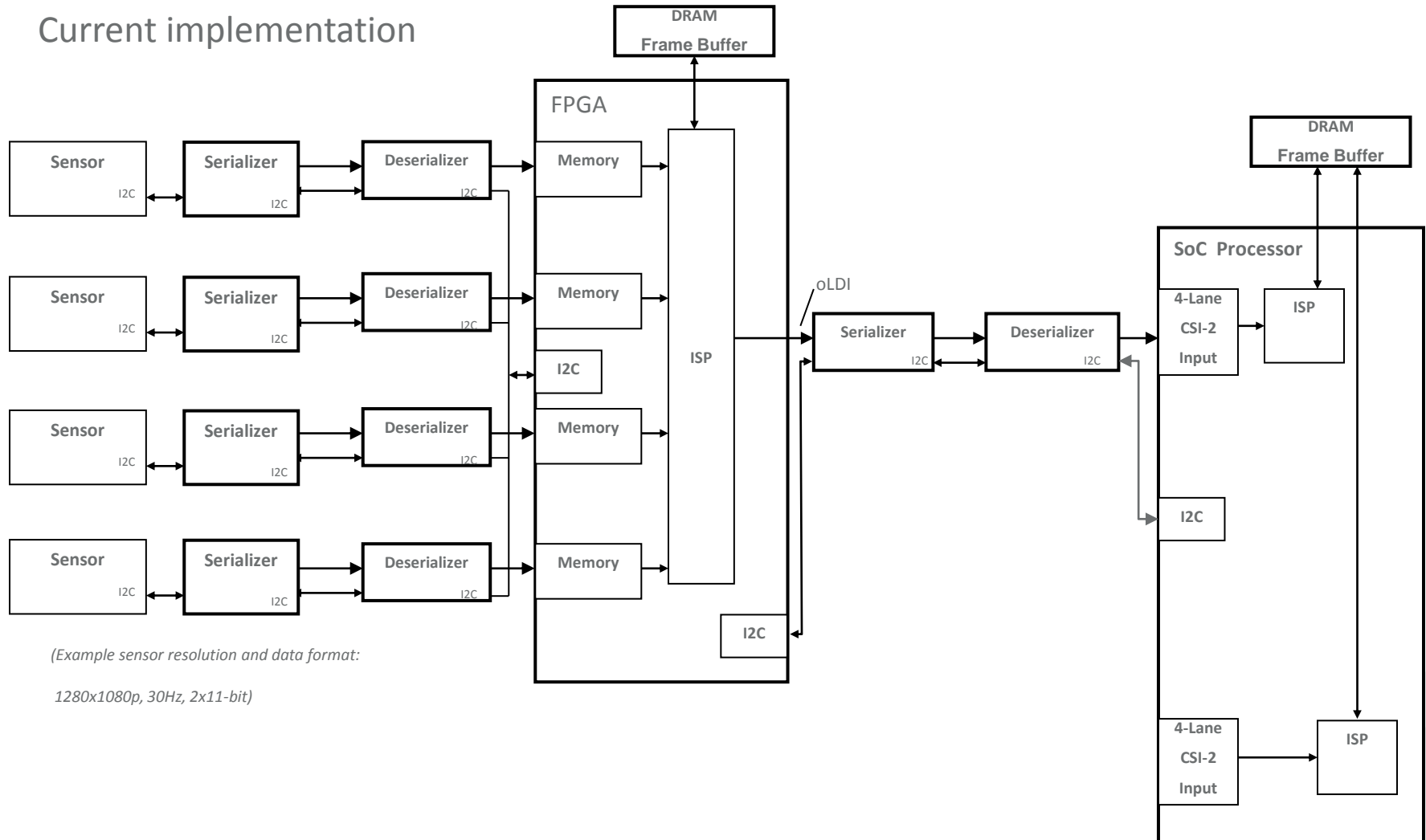
# Serial Link Solutions

# Overview

- Speeds higher due to HD video and embedded Ethernet
  - > Forward increasing 3Gbps → 6Gbps → 10Gbps
  - > Reverse increasing 1Mbps → 100Mbps → 1Gbps
- Other potential contributors to higher speed
  - > Daisy-chain display, 120fps, RGBW8888
- Possibilities to reduce rate
  - > Packet protocol, low overhead coding, “visually lossless” compression
- Maxim advantages
  - > STP or Coax (forward + reverse + power)
    - > Possible dual cable mode for lower speed per cable
  - > Coax cable/connector good for several generations (3/6/10Gbps)
- Ethernet
  - > 100Mbps BroadR-Reach, 1Gbps (RTPWG)
  - > Advantages: standard, UTP cable, network
  - > Disadvantages: software overhead, delay, artifacts, higher cost silicon

# 4-Camera System Using FPGA and Discrete Deserializers

Current implementation



(Example sensor resolution and data format:

1280x1080p, 30Hz, 2x11-bit)



# Advantages of MAX9286 for Surround View

- Lowers system cost
  - Eliminates the FPGA used to aggregate inputs from cameras
  - Power-over-coax for cameras
- Lowers design time
  - Automatic generation of camera synchronization signals
  - Image data from multiple sensors aligned to same pixel
  - Maskable control channel broadcast write to simplify sensor programming
- Diagnostic capability
  - Short to power/gnd for each GMSL link
  - Camera(s) out of sync



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# Automotive RF Solutions

Precision Navigation

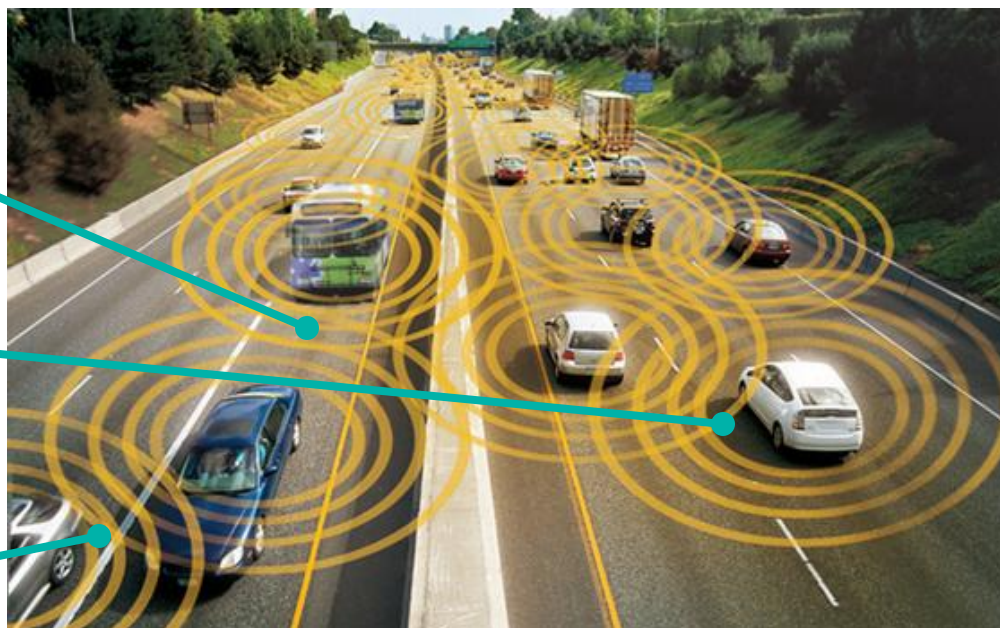
# Future of Navigation

Helping to create a safer driving experience

Collision warning

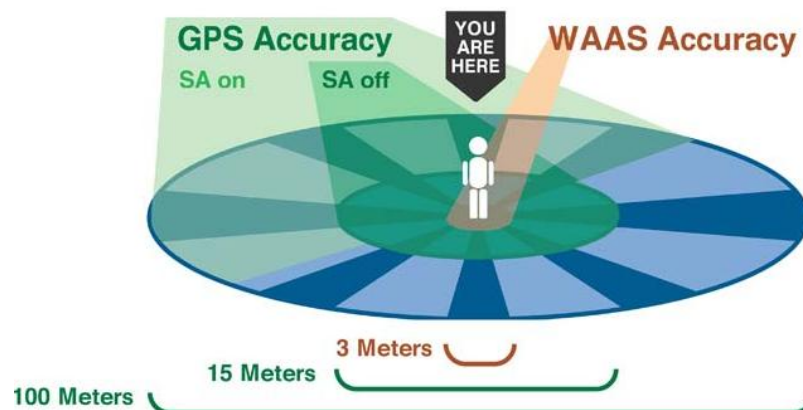
Lane assistance

Blind-spot detection



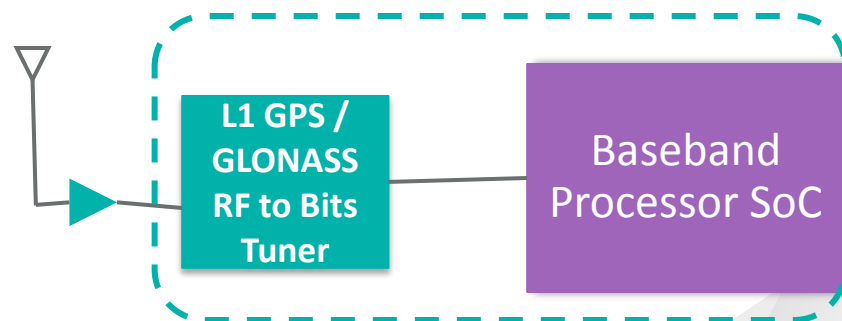
# Traditional GNSS

- Accuracy: 5m – 100m
- Applications
  - > Infotainment
  - > Telematics
  - > Navigation
- How?
  - > Primarily uses GPS/Glonass L1 band + SA + WAAS
  - > Single satellite coverage plus augmentation was sufficient



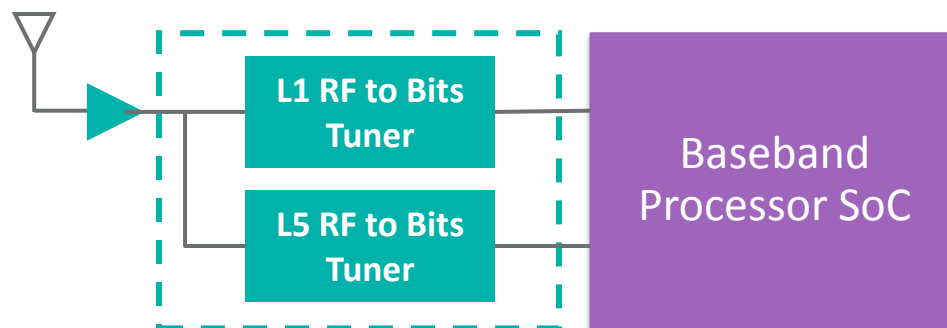
SA = Selected Availability

WAAS = Wide Area Augmentation System



# Precision Navigation Delivers 0.5m Accuracy

- **Accuracy: 0.5m**
- Applications
  - > ADAS
  - > Vehicle 2 vehicle (V2V)
  - > Autonomous driving
- How?
  - > Simultaneous acquisition using L5 band
  - > More satellite coverage
    - GPS, GLONASS, Galileo, BeiDou



# Why Maxim for GNSS?

## Performance

- Dual channel simultaneous L1/L5 signal reception enables 0.5m position accuracy

## Flexibility

- Cover all satellites & augmentation bands
- AFE interface flexibility
- Baseband agnostic

## Automotive Grade

- AEC-Q100 qualified
- ISO/TS 16949 certified
- Auto GPS receiver supplier since 2011



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**Thank you!**