Semiconductors for the Connected World – Safe, Secure, Smart

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SECURE CONNECTIONS FOR A SMARER WORLD
Waves of Innovation

1. Mainframe
2. Mini-Computer
3. PCs
4. Cell Phones
5. IoT/ AI

Units Shipped

- 10B
- 1B
- 100M
- 10M
- 1M
- 0.1M
- 0.01M


Bipolar
Bipolar ICs
CMOS MPU
DRAM
Fast Air Interface
Servers
Free Storage, Big Data
Neural Networks & Processing

Source: Extracted from Jefferies Report

IoT/ AI
the next innovation wave
Massive Growth in Smart Connected Devices

Forecasted IoT market growth from **15 billion** devices in 2015 to **31 billion** devices in 2020 and **75 billion** in 2025

Source: IHS
The Internet of Things is Transforming Our World

- **Sensing**: Precise perception of the analog and human environment
- **Connectivity**: 1B+ additional consumers online, 30B+ connected devices
- **Processing** (incl AI, ML): 40B+ devices with intelligence shipped in 2020
- **Safety & Security** (incl Privacy): Physical and functional safety & security to protect the smarter world
High-Performance Sensing
Precise recognition of the analog & human environment

Beyond Line of Sight

Mesh Networks (V2X, ZigBee)

Below Line of Sight

Radar
Laser
Vision
Ultrasound

Face & Gesture Recognition
Biometrics (Fingerprint & Iris)
Voice Recognition
Motion, Pressure, Temperature Sensing

Human Contact

NXP
Wireless Connectivity
Connectivity landscape with varying performance, energy, range

ULTRA-SHORT RANGE

SHORT RANGE

WIDE AREA

CAT-M1
NB-IoT

UWB
DSRC (V2X)

THREAD

5G

CAT-M1
NB-IoT

5G
Moving from Cloud to edge: Edge Computing
Efficient, High-Performance Processing

- **Economics**
  - Performance & efficiency
  - Less bandwidth & storage

- **Robustness & Safety**
  - Latency & availability

- **Data Protection**
  - Privacy & security

- **Enable Real-Time Analytics and Actuation**
  - Time sensitive applications not hampered by network latency

- **On-Board Machine Learning**
  - Precise & fast detection, classification, adaptation

- **Reduce Data Center Traffic**
  - Data centers only process & store relevant data

- **Reduce Network Cost**
  - Local processing shields Cloud from large part of raw data

- **Safeguard Privacy**
  - Transmit semantic data rather than raw data

- **Increase Security**
  - Resilience to offline conditions
Security 2.0 Built Into Everything We Do

Security & Privacy by Design

Connected Things Lifecycle Management

- Interoperability
- Authentication
- Root of Trust—Secure BOOT
- Device Integrity
- SW Management
- Secure Access
- Credential Management
- Data Integrity & Privacy
- Encryption
Megatrends Transform Automotive Industry

Connected Infotainment

ADAS → Autonomy

Electrification

ZERO Time Wasted

ZERO Accidents/Congestion

ZERO Emissions

Safe and Secure Mobility
Megatrends Drive Exponential Performance Requirement

Data Generation (TeraByte per hour)
- Dramatically more sensors
- Higher precision

Compute Performance (TFLOPS)
- ADAS & autonomy
- e-Cockpit

Network Bandwidth (GigaBit per Second)
- Loads of data (on & off board)
- Real-time distributed applications

Source: NXP
Megatrends Sustainably Boost Semi Car Content

Connected Infotainment

-+$100 Premium Experience

ADAS $ Autonomy

-+$150 Level 2
-+$600 Level 3
-+$1200 Level 4&5

Electrification

-+$400 Hybrid
-+$450 Full Electric

Safe and Secure Mobility

... from $380 average semi value (TAM) per car in 2018

1. Source: Strategy Analytics, NXP
2. Semi content based on 2020 price levels