CONNECTION SYSTEMS.
GLOBAL OVERVIEW.
Contents

Aptiv overview

Connection Systems overview

Manufacturing & engineering capabilities

A comprehensive portfolio
Welcome to Aptiv. 

Company overview.
We are a global technology company that develops safer, greener and more connected solutions, which enable the future of mobility.
Power and Flexibility of Global Footprint and Talent

$12.9B 2017 revenue

$19.3B in bookings

$1.1B global engineering investment

150,000 Employees in 45 countries

16,000 engineers

6,000 focused on software

109 manufacturing sites

14 major technical centers
Experienced Leadership Team
Addressing Mobility’s Toughest Challenges
Urban Mobility

CHALLENGES by 2050

- +70% of population
- +40% freight
- 5x emissions
- 4x cost
- 3x travel time

BENEFITS of mobility automation to cities

- 28% fewer vehicles
- 87% fewer accidents
- 66% lower emissions
- 44% fewer parking spaces
- 30% shorter travel time
Aptiv Addressing Mobility’s Toughest Challenges

Aptiv provides end-to-end solutions that allow us to commercialize new mobility.
Industry-leading Software Capabilities

Global Footprint

Bangalore, India • Boston, MA • Krakow, Poland
Pittsburgh, PA • Shanghai, China • Wuppertal, Germany

30+ Key Partnerships

University Engagement
Software

STRONG FOUNDATION IN SOFTWARE AND ARTIFICIAL INTELLIGENCE EXPERTISE

ENGINEERS DEVOTED TO SOFTWARE

6,000+

LINES OF CODE SHIPPED DAILY

40B

LEADER IN SOFTWARE DESIGN & USER EXPERIENCE
Sensing & Computing
VEHICLES DEMANDING EXPONENTIALLY MORE COMPUTING POWER

DATA TRANSFER SPEEDS
- Future: 6+ GBPS\(^1\) (~90X)
- 2020: 1.5 GBPS\(^1\) (~22X)
- 2015: 65 MBPS\(^1\)

DECISION MAKING
- Future: 200 TFLOPS\(^2\) (~10kX)
- 2020: 2 TFLOPS\(^2\) (~1kX)
- < 0.2 TFLOPS\(^2\)

DATA GENERATION
- 40+ Terabytes / Hour
- 2020: 2TB

1. Megabits per second and gigabits per second
2. Teraflops (TFLOPS) – trillion floating point operations per second
Signal & Power Distribution

SOFTWARE ENABLED FEATURES DRIVING GREATER DEMANDS FOR OPTIMIZED NEXT GENERATION ARCHITECTURES
Connectivity

Connected Services technology to be embedded in Aptiv products by 2020
Connectivity
SOFTWARE-ENABLED SOLUTIONS

Scalable cloud platform that:
Enables Aptiv to deliver AMoD and Connected Services
Supports 3rd party application ecosystem and data brokerage

AMoD Services
Connected Services
(e.g. OTA, fleet management)
3rd Party Data Brokerage
3rd Party Application Ecosystem
Enabling End-To-End Mobility Solutions

CONNECTING THE VEHICLE TO THE SURROUNDING ECOSYSTEM; DATA SERVICES AND SMART MOBILITY MOVE BEYOND THE VEHICLE TO CREATE VALUE.
Global Mobility & Services Capabilities

UNMATCHED POSITION IN MOBILITY & SERVICES WITH DEEP CAPABILITIES IN SOFTWARE DEVELOPMENT, AUTOMOTIVE GRADE INDUSTRIALIZATION AND SYSTEMS INTEGRATION

- 55 PhDs in applicable fields
- 300+ Engineers devoted to automated driving
- ~70 cars today with 150+ on the road by end of 2018
- 10M controllers with embedded OTA by 2020

Location:
- Las Vegas
- Pittsburgh
- Boston
- Wuppertal
- Singapore
- Shanghai
Expanding Las Vegas Presence

NEW AUTOMATED DRIVING TECH CENTER AND EXPANDED LYFT DEPLOYMENT

OPERATIONS AND COMMAND CENTER
Hub for operational support, while also enhancing development and testing

TECHNOLOGY SHOWCASE
Innovation and customer demonstration showcase

DEPLOYING 30 APTIV AUTOMATED VEHICLES ON LYFT NETWORK
Multi-year agreement represents clear step toward commercialization
Continued strong progress on Las Vegas deployment

16,000+ RIDES GIVEN ON THE LYFT NETWORK

4.94 OUT OF 5 RIDER RATING

FLEET MANAGEMENT PARTNER FOR LAS VEGAS
Global Connection Systems overview.
APTIV’s Business Segments

SEGMENTS REFLECT EVOLVING CAPABILITIES AS THE ONLY PROVIDER OF INTEGRATED BRAIN AND NERVOUS SYSTEM

ADVANCED SAFETY & USER EXPERIENCE
Formerly Electronics & Safety
Encompasses our deep expertise in software, centralized computing platforms, advanced safety systems and automated driving, while acknowledging the growth in areas that enrich the in-vehicle experience.

SIGNAL & POWER SOLUTIONS
Formerly Electrical / Electronic Architecture
Reflects the growing significance of next-generation architectures with high-speed data and electrical power distribution as the foundation necessary for future mobility.

- Advanced Safety & User Experience
- Connectivity & Security
- Mobility & Services
- Signal & Power Solutions
- Engineered Components Group
- Electrical Distribution Systems
- Hellermann Tyton
- Connection Systems

Connection Systems Overview | Mar 2019 | Aptiv
Power and Flexibility of Global Footprint and Talent

$3.5B 2018 revenue
10 strategic product lines

17,000 employees
2,431 engineers
37 manufacturing sites
12 major technical centers

Connection Systems Overview | Mar 2019 | Aptiv
Driving Standards Through Leadership

88 Standards Representatives
Supporting 77 Standards Committees
Within 30 Standards Organizations
Manufacturing & engineering footprint.
Global innovation. Local implementation.

12 technical centers
>2,000 scientists & engineers
9 test labs, 14,000 m²

R&D and engineering capabilities:
Design | Mold flow | Metrology | Vibration | Locking efficiency | High Voltage testing | Temperature & Humidity cycling | Corrosion tests | Waterproofness tests | CT scanning

APTIV
Leveraging global tooling capabilities.

• Strong competitive advantage
  - Global tooling centers in China and India
  - Regional tool factories in Mexico

• Footprint
  - Largest tool room in Shanghai
  - Incremental expansion in Mexico and India

• Investing in capabilities
  - Expanding the usage of tool and sub-tool standards
  - Focus on quality and lead time
Delivering global test & validation capabilities.

- Strong competitive advantage
  - Industry and key customer certified
  - State-of-the-art test technologies
  - Regional capabilities, global coverage

- Investing in capabilities
  - Tripled Shanghai floor space
  - Launched new laboratory in Mexico
  - Expanded laboratories in Krakow and India

<table>
<thead>
<tr>
<th></th>
<th>Americas</th>
<th>EMEA</th>
<th>AP</th>
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</thead>
<tbody>
<tr>
<td>Electrical</td>
<td></td>
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<tr>
<td>Mechanical</td>
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<tr>
<td>Environmental</td>
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</tbody>
</table>
Our scalable portfolio enables smart mobility solutions.
Advanced Technology Drives Connection System Evolution

Consumer demand and regulatory driven

Next generation architecture challenges

Technology drivers

Technology focused on megatrends drives market growth
A Comprehensive Product Portfolio

12 strategic product lines aligned with market needs, trends, and growth opportunities.
The most sophisticated electronic device you own, your vehicle, has more computing power than a space shuttle. Today, you find up to 2200 terminals in up to 280 housings to power it.
Connection Systems: Housings

One of the industry’s most complete automotive connection system portfolios. Available for device and in-line connections for most vehicle applications, with various terminal type options.

<table>
<thead>
<tr>
<th>Segments</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powertrain &amp;</td>
<td>• Engine sensors</td>
</tr>
<tr>
<td>Engine Area</td>
<td>• Fuel injectors</td>
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<tr>
<td></td>
<td>• Wiper systems</td>
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<tr>
<td></td>
<td>• Cruise control</td>
</tr>
<tr>
<td></td>
<td>• Engine control module</td>
</tr>
<tr>
<td>Active &amp; Passive</td>
<td>• Seat systems</td>
</tr>
<tr>
<td>Safety</td>
<td>• Ride control</td>
</tr>
<tr>
<td></td>
<td>• Power steering</td>
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<td></td>
<td>• External lighting</td>
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<tr>
<td></td>
<td>• Door controls</td>
</tr>
<tr>
<td></td>
<td>• Mirror features</td>
</tr>
<tr>
<td></td>
<td>• Body control module</td>
</tr>
<tr>
<td>Body &amp; Chassis</td>
<td>• Radio</td>
</tr>
<tr>
<td></td>
<td>• Speakers</td>
</tr>
<tr>
<td></td>
<td>• Amplifiers</td>
</tr>
<tr>
<td></td>
<td>• Rear seat entertainment</td>
</tr>
<tr>
<td></td>
<td>• Navigation</td>
</tr>
<tr>
<td></td>
<td>• Telematics</td>
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<tr>
<td>Multimedia</td>
<td>• Climate control</td>
</tr>
<tr>
<td></td>
<td>• Multifunction switch</td>
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<tr>
<td></td>
<td>• Ambient lighting</td>
</tr>
<tr>
<td></td>
<td>• Accessory power outlet</td>
</tr>
<tr>
<td></td>
<td>• Overhead systems</td>
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<tr>
<td></td>
<td>• Clusters</td>
</tr>
<tr>
<td>Interior</td>
<td>• Climate control</td>
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<td></td>
<td>• Multifunction switch</td>
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<td></td>
<td>• Overhead systems</td>
</tr>
<tr>
<td></td>
<td>• Clusters</td>
</tr>
</tbody>
</table>

Active:
- Anti-lock braking
- System / electronic
- Stability control
- Electronic park brake
- Traction control

Passive:
- Passenger occupant detection system
- Sensing diagnostic module
## Connection Systems: Terminals

A full range of terminals providing a perfect combination between electrical and mechanical performance.

<table>
<thead>
<tr>
<th>Segments</th>
<th>Products:</th>
</tr>
</thead>
</table>
| **Standard One-Piece** | • OCS  
• SICMA  
• APEX (Male)  
• MTS-ST  
• GTS  
• GT  
• Metri Pack  
• HES |

<table>
<thead>
<tr>
<th><strong>Standard Two-Piece</strong></th>
<th>Products:</th>
</tr>
</thead>
</table>
| • CTS & TTS  
• DCK  
• DSQ  
• DCS  
• MTS  
• DuoTwin  
• DTK  
• BTS  
• APEX (Female)  
• DUCON  
• HDK  
• HETS |

<table>
<thead>
<tr>
<th><strong>Ring Terminals</strong></th>
<th>Products:</th>
</tr>
</thead>
</table>
| • Standard  
• With integrated nut  
• Stackable  
• Battery terminals  
• Al cable application  
• Special application |

<table>
<thead>
<tr>
<th><strong>Bus Bars</strong></th>
<th>Products:</th>
</tr>
</thead>
</table>
| • One-piece  
• Clinched  
• With bolts |

<table>
<thead>
<tr>
<th><strong>Other</strong></th>
<th>Products:</th>
</tr>
</thead>
</table>
| • Clips  
• Splices  
• Tuning Forks  
• Tabs |
## Mechatronic Packages and Pin Headers

### Mechatronic Packages
- Pin count @ 2 ~ 100 pins
- Product outline > PCB dimension
- Includes other mechanical functions
  - ABS & ESC housings
  - Radar & Lidar housings
  - Sensor housing (pressure, acceleration)
  - Air management (TPS cover, sensor)
  - Fuel supply (injector headers)
  - Sub systems
  - Transmission
  - Exhaust treatment

### Pin Headers
- Pin count 2 to 300+
- Product outline < PCB dimension
  - Engine control
  - Body & security
  - Comfort
  - Passive safety
  - Steering
  - Data ports

### Press-fit Based Pins
- 0.40, 0.60 & 0.80 product family
  - Engine management (ECUs)
  - Restraint controller (SDMs and PODS)
  - Radar housings (SRR, MRR)
  - Other modules (Body controller, Seat Modules)
  - In-house high speed stamping

### Assembly Technology
- Automated manufacturing capabilities
  - Globally aligned processes for best-in-class production capabilities
  - Tailored to customer & product
  - Complex over molding & multi-component molding
  - Highly integrated assembly solutions
  - Fully automated EoL inspection

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**Applications**

### Engine management (ECUs)
- Restraint controller (SDMs and PODS)
- Radar housings (SRR, MRR)
- Other modules (Body controller, Seat Modules)
- In-house high speed stamping
Safety Restraint Systems (SRS)

The world’s leader in safety restraint connection systems. A critical part of each vehicle’s safety systems.

**Applications**

- Frontal airbags (driver, passenger, knee, steering column)
- Side airbags (thorax, pelvis, head)
- Pretensioners (belt, buckle)
- New Applications (center airbag, inflatable belt)

**SRS Pigtails**
- Cockpit Applications

**SRS Sealed**
- Harsh Environment

**SRS Jumper**
- Sub-Assemblies

**Retainers**
- Igniter interface inserts for all major standards (ABX-5, AK-2, AK2+, AK-1, FCI)
Data Connectivity: High Speed Cable Assemblies

A complete line of data connectivity products enabling the linkage of vehicle occupants with the vehicle environment. Seamlessly transmitting gigabits of data.

**Segments**

**Multicore Links**
- USB Standard A / mini B
- USB / LVDS / multi-protocol connections
- Data rates up to 2.5Gbps
- Camera & infotainment

**Coax Links**
- Fakra stamped & formed sealed and unsealed
- RF Antennas
- LVDS / APIX connections
- MiniCoax with optimized package size & performance

**2-wire Links**
- AMEC: Unshielded 100Mbps / shielded 1Gbps Ethernet
- H-MTD: Shielded 1G/5G/10G Ethernet
- High data rates for ADAS / Autonomous driving

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High Power / High Voltage: Interconnects

Leading the way in vehicle electrification solutions for OEMs and device manufacturers globally.

High Voltage Auxiliary Modules
- Applications up to 40A, 1000V
- Integrated HVIL
- 2W-4W systems, inline, splice systems

High Voltage Power Conversion
- Applications up to 250A, 1000V
- Integrated HVIL
- 2W, 3W systems, pass-thru systems

Segments

Applications

- DC converter
- On-board charger
- Electric air conditioning
- Electric heater
- Coolant heater control

- Inverter
- Drive motors
- Motor generator unit
- Battery
High Power / High Voltage: Inlets

Leading the way in vehicle electrification solutions for OEMs and device manufacturers globally.

- All global vehicle interfaces
- Temperature sensing
- Custom designs for OEM needs

- SAE J1772
- IEC type II
- GB-T
- Combo 1/Combo 2 fast charge
High Power / High Voltage: Charging

Leading the way in vehicle electrification solutions for OEMs and device manufacturers globally.

- Chargers and Charging Cables
  - Global certifications
  - Global vehicle interfaces
  - Temperature protection grid plug
  - Charging up to 11KW power

Applications

- Mode 2 EVSE
- Mode 3 cable assemblies
- Interface pigtails for charging
On-glass Connection Systems

Providing the complete part and process solution for power and signal applications.

Segments

- Pre-soldered and Pre-fluxed Terminals
- Specialty Cable Assemblies
- Soldering Systems

Applications

- Customized terminal solutions with precise solder dimensions
  - Power connection for heated rear window
  - Ergonomic and low profile button terminals with low contact resistance
  - Lead or lead-free solder
  - For use on laminated or tempered glass
- Customized specifications for space, weight, packaging, and functionality requirements
  - FFC’s for heated windshield connections
  - Braided wire assemblies for high current applications
  - Coaxial and wave trap antennas
  - Anti-theft glass sensor connections
- Q Box soldering controller is the base of the system
  - Customized resistance soldering application equipment
  - Single or multiple solder joints
On-Glass application engineers located globally to setup, monitor, and troubleshoot process conditions
## Electrical Centers: Power Distribution, Switching and Circuit Protection

<table>
<thead>
<tr>
<th>Segments</th>
<th>12V Electrical Centers</th>
<th>Battery Electrical Centers</th>
<th>48V Electrical Centers</th>
<th>12V (Stop/Start) High Power Switching</th>
<th>Discrete Solid State Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Applications</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Power distribution, switching, and circuit protection</td>
<td>- On-battery circuit protection</td>
<td>- 48V solutions</td>
<td>- Dual power source smart switching</td>
<td>- Capable of driving resistive, capacitive and inductive loads</td>
<td></td>
</tr>
<tr>
<td>- Solid State, PCB or Hard-Wired technology</td>
<td>- Optional battery disconnect, start/stop load switching</td>
<td>- Traditional and Solid State circuit protection</td>
<td>- Voltage stabilization</td>
<td>- Replaces EM relays and discrete circuits</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Arc fault prevention and detection</td>
<td>- Solid State</td>
<td>- 10 to 40 Amp applications</td>
<td></td>
</tr>
</tbody>
</table>
Consumer Connectivity: Media

Aptiv offers a complete set of digital data connectivity solutions allowing an easy connection to charge and broadcast passenger media within the vehicle environment.

### Applications

**Consumer Connectivity Media Modules**
- USB 2.0 and 3.0 data hubs
- Support for Apple CarPlay™
- USB Type A and Type C connectors
- USB Type A and Type C chargers
- Type C USB power delivery
- HDMI data serializers

**RSE (Rear Seat Entertainment) Peripherals**
- Analog headphones
- Digital headphones
- Transmitter solutions
- Remote controls
Consumer Connectivity: Wireless Charging

Aptiv offers a range of wireless charging solutions allowing for user-friendly wire-free device charging.

Wireless Charging Systems

Wireless charging for end user devices (mobile phone, Apple series products, tablet)
- Meets WPC Qi standard
- Near Field Communication (NFC) capability
- Automotive compliant design incorporating CAN/LAN interfaces
- Low standby power and Foreign Object Detection (FOD)
To Learn More About Us

1. Visit our website
   http://aptiv.com/

2. Browse our E-catalog
   http://ecat.aptiv.com/

3. Follow us on

   - Facebook
   - Twitter
   - LinkedIn
   - Instagram
   - WeChat

   ID: Aptiv_China
Thank you.