

# Zonal Architecture: Five Revolutions in Vehicle Design

Zonal architecture is ushering in a new era in vehicle electronics design. Grouping functions of the vehicle by location zones with each zone being responsible for the devices that are installed in a particular section of the vehicle, zonal connections must be made through a locally installed zonal controller or gateway. This new approach leverages the latest developments in computing power and high-speed communication, both of which will be essential due to the huge increase in data that must be processed in the next generation vehicle. So how is this new architecture revolutionizing vehicle design?



## Fundamentally changes the future of vehicle wiring

The functions of the vehicle are grouped by location within the vehicle, including lights and sensors, motors, and controls. Each location is described as a zone and controlled by a gateway, placed close to the components for which it is responsible. The individual cables that link components to the controller are kept short, keeping the complexity and weight to a minimum. Each of the zonal gateways connect to the central computing cluster at the heart of the vehicle. As a result, inter-zonal communication can take place over a small, high-speed networking cable that greatly reduces both the quantity and size of the cables installed throughout the vehicle.

## Simplifies vehicle manufacturing and installation through modular assembly

Historically the cable harness in vehicles has been an expensive and time-consuming component to manufacture. With the adoption of new technologies, the cable harness grew in complexity with the increased sophistication and saturation of components. Previously designed as one component that delivered power and stretched the length of the vehicle, data and control signal requirements means the harness had a complex shape that was costly to both make and install.

Zonal architecture reduces the complexity of the cable harness and simplifies harness installation. Instead of handling harnesses that stretch over the entire length of the vehicle, each zone can be installed in a modular fashion.

## Makes hardware universal

Modular assembly will also bring about a new era of standardization. The connection between the central computing cluster and the zonal gateways can remain unchanged between different models and types of vehicles, and devices can be added in a modular fashion to each gateway to enable variations. This means the hardware of zonal architecture can be universal, significantly reducing manufacturing time and resources while allowing easier customization across varying vehicles in production.

## Eases updates and repairs

The plug-and-play functionality will allow repairs or updates to be applied easily within the dealer network rather than in complicated workshops. The connection of the vehicle to the 5G cellular network will enable software to be updated remotely, a feature that is already being employed by some manufacturers. Gone are the days of setting aside time to have the car serviced at the shop, secure a replacement car while it's in service, and many other inconveniences. A quick over-network repair will just be a phone call away.

Although the move to zonal architecture will be led by software, the physical structure will play a significant role in making this

concept a reality for manufacturers. Smarter wiring, easier assembly, universal hardware and advanced modularity are just a few of the ways [zonal architecture is revolutionizing vehicle design](#).

Molex is applying decades of experience in automotive connectivity to the development of solutions for next generation zonal architecture. Explore zonal architecture and the many implications for automotive manufacturing: [Vehicle Architecture: The Innovation Turning Point](#).

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