

Objectives:

Brief history of computers, networks, and gov't Introduce concepts. Introduce network types, names, users.

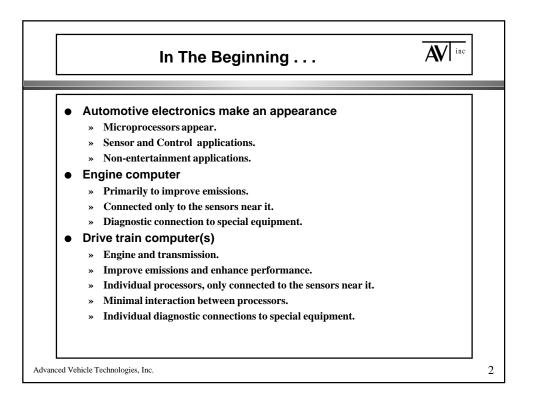
Provide an overview of where the industry is now and where it might be going.

Two tacts:

History and very top level view

Nitty gritty technical details

History is brief, how it got here, why is the government involved



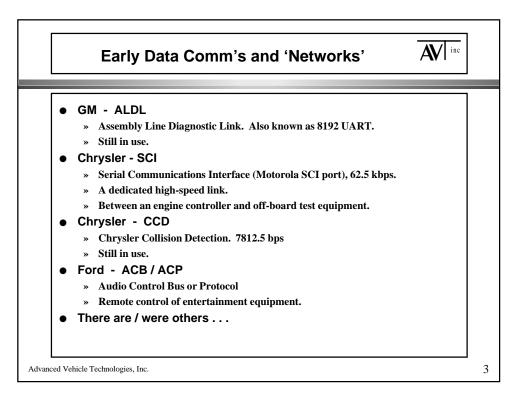
Electronics in early cars consisted of AM/FM radio.

Then 8-tracks, then cassette.

First real microprocessors were engine controllers.

Primarily designed to improve emissions.

Originally they supplemented the existing engine technology.



Early data links were for off-board diagnostic equipment.

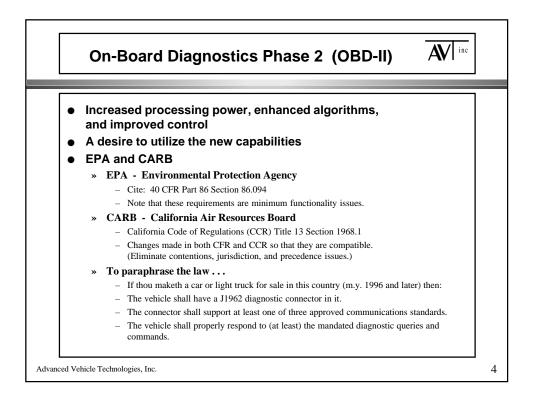
Diagnostic equipment was specialized and only for one module type.

ALDL eventually grew to become a networking standard.

All of these buses used UART technology.

CCD was first real attempt at a network, including a messaging strategy.

There were / are others. Refer to slide #7, J2056.



Emissions control was a primary objective.

As processing power and memory improved so did control algorithms as well as control and sensor technology.

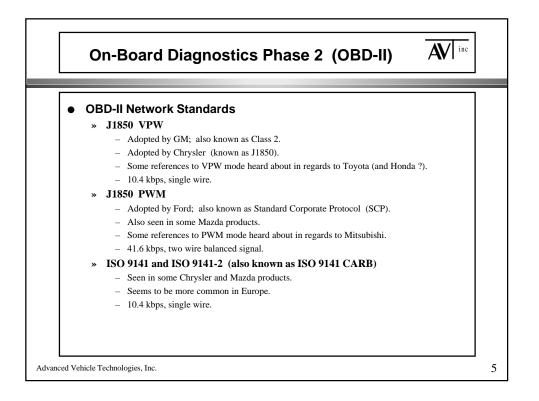
EPA and CARB wanted to make use of these new capabilities.

Emissions control and testing was a one-time stationary event. e.g. tailpipe testing.

Two levels of testing: corporate (CAFE) and individual (tailpipe).

They desired to move it to be an individual responsibility. e.g. the car should monitor itself.

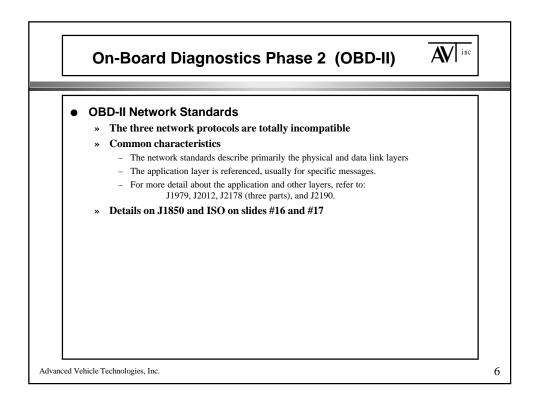
Thus want every car to have some type of standardized diagnostic interface, hence OBD-II.



OBD-II purpose was/is to make it easy for testing and inspection stations to establish communications with the vehicle and query it for information regarding its performance.

Stored trouble codes, snapshot data, clearing trouble codes, queries, responses, security.

Additional technical details about these networks at the end of this presentation.



None of the OBD-II network standards are compatible.

Referenced standards:

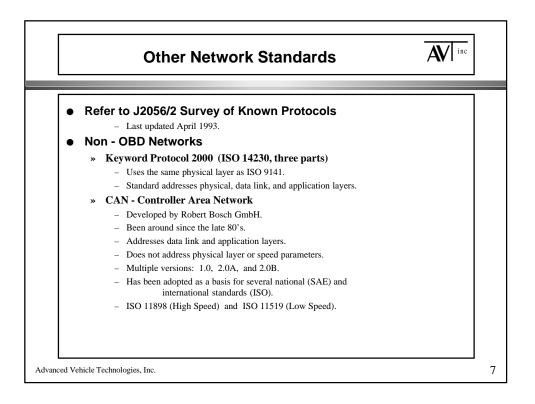
J1979 is a required.

All others are recommended practices.

They provide framework for growth,

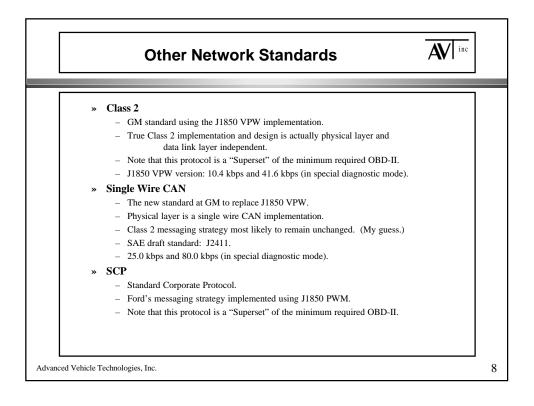
meet manufacturer proprietary requirements,

and meet minimum OBD-II requirements.

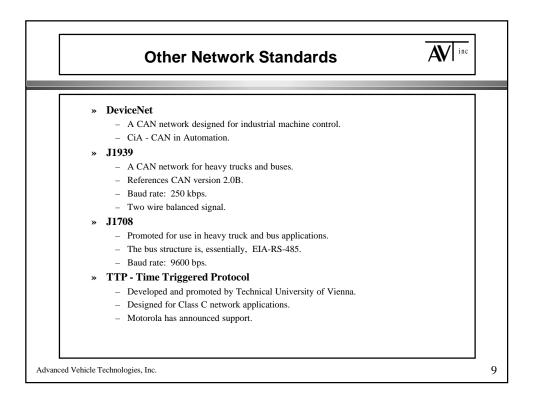


There are lots of other standards, these are not OBD-II. But they are some form of networking.

We will only cover those that are somehow connected to vehicle applications.



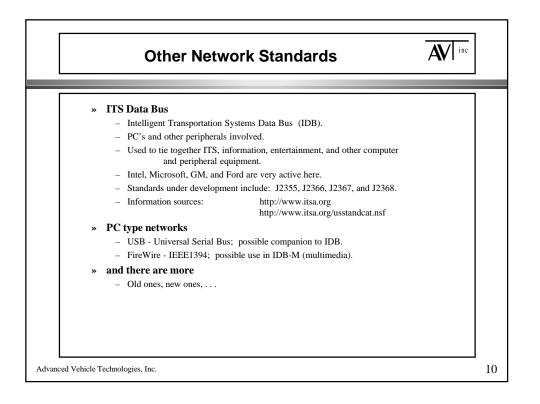
Note the baud rates for Class 2 based on J1850 VPW SWC



J1939

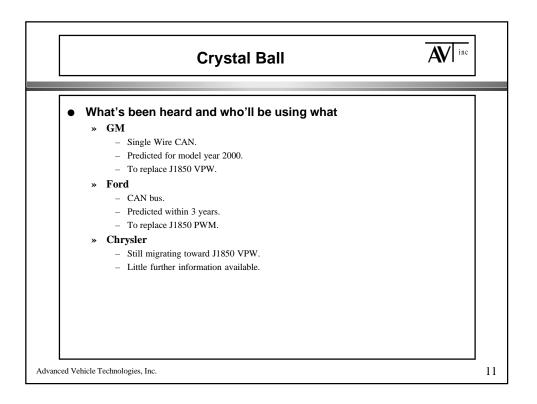
Consists of multiple parts.

The specification is rather rigid.

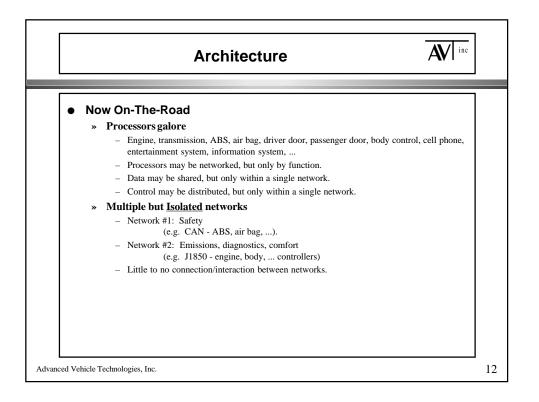


Others

Reference the J-spec. on slide #7.



What are each using now. What are they moving towards.

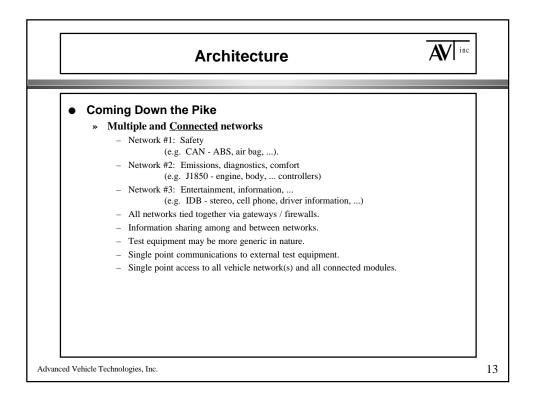


Number of microprocessors and microcontrollers.

Not talking about entertainment equipment.

How the various units do or do not communicate.

Stress: there are various networks, they are not connected.

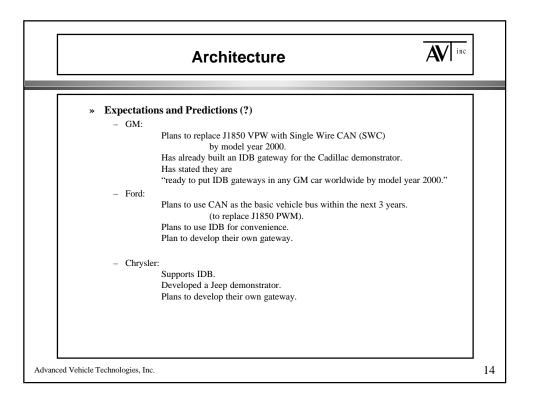


Even more processors, power, and memory.

Even more control and sensor functions.

Even more capabilities.

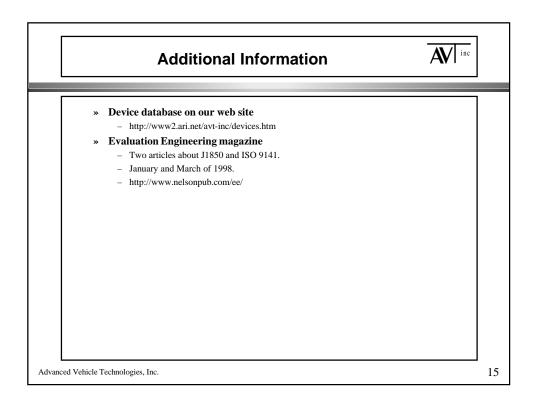
Stress: Networks are to be connected together. Use of network bridges or gateways.



Who has done what.

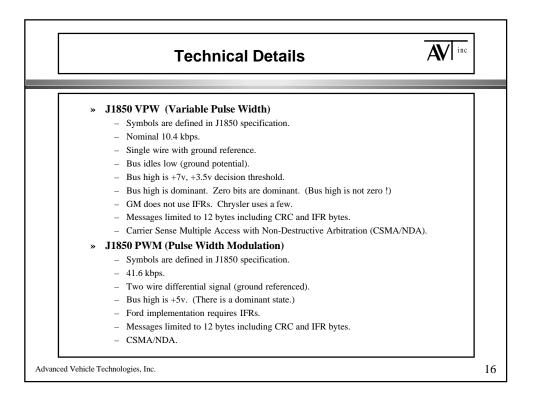
Who is heading in what direction.

What I know about who is planning on doing what.



The database is J1850 device specific.

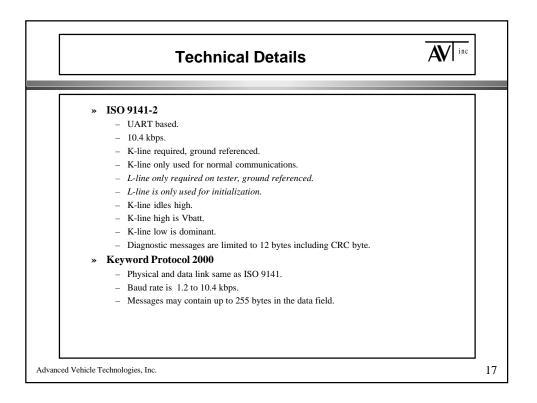
Evaluation Engineering article are 'supposed' to be archived on their web site.



Note that J1850 is different from UART based communications.

J1850 uses defined symbols to delineate a complete message.

UART based protocols rely on timing issues to convey this type of information. There is symbol ambiguity in UART systems.



These are wired 'OR' circuits.

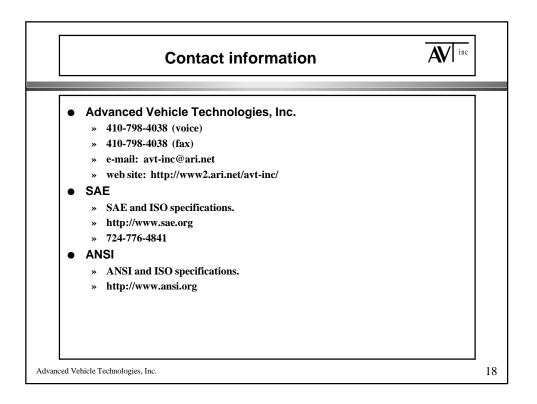
Timing is the critical element and controls bus operations.

The KWP 2000 message maximum length is ~259 bytes, header+data+CRC.

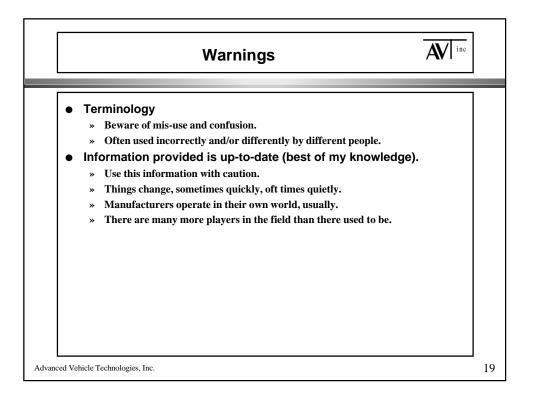
The K-line is bi-directional.

The L-line, if used, is uni-directional.

KWP 2000 is not an OBD-II protocol. Does not have to support the OBD-II messaging strategy.



SAE offers specification download direct from their web site.



Watch how individuals use the various terminology.

More players on the field; means the business climate has changed. Used to be one big guy on the block who called all/most of the shots.

My version of a legal disclaimer.