

# **THE DAY THE CARS STOOD STILL: 1951 Sci-Fi or 2013 Reality?**

**Richard C. and Cheryl Dancey Balough  
Balough Law Offices, LLC – Chicago, IL  
[www.balough.com](http://www.balough.com)**

**Institute on the Law of Cyberspace, Los Angeles, January 2013**

# **Cars Today Are Mobile Computers**

# **Nature of Car Computers**

**Electronic Control Units (ECUs) control functions such as:**

**Drivetrain**

**Engine**

**Brakes**

**Lighting**

**Security**

**Entertainment**

# **Proliferation of ECUs**

**Modern cars have:**

**Up to 70 distinct ECUs**

**With hundreds of millions of lines of code**

**All interconnected**

# **Access to ECUs**

**Access can be achieved via:**

**Indirect physical channels**

**Wireless remote connections**

**Vehicle-to-vehicle communications**

**Addressable channels**

# **Indirect Physical Channels**

**Federally-mandated OBD-II port**

## **Purpose**

- **Used for diagnostic testing of vehicles by service centers**
- **Access limited to one vehicle at a time**

## **EXCEPT**

- **Car manufacturer -->  
Internet updates to dealerships server -->  
updates individual diagnostic computers -->  
connected to cars**

# **Indirect Physical Channels**

**Entertainment systems**

**Accessible via**

**Individual disc**

**USB**

**iPod**

# **Wireless Remote Connections**

## **Bluetooth**

**Cell phones**

**Smart phones**

**Apps**

**Games**

**Various programs**



# **Wireless Remote Connections**

## **Remote Keyless Access**

**RFID keys**

**Limited distance**

**Vehicle by vehicle**

**Signals capable of being captured**

# **Wireless Remote Connections**

**Tire pressure monitoring system**

# **V2V Wi-Fi**

**Purpose: safety (e.g., crash avoidance)**

**May be connected to vehicle-to-infrastructure  
(V2I) sensors**

**Road conditions**

**Stoplight status**

**Accident locations**

**Mid-range communication**

A dark background featuring a curved horizon line of Earth from space, with a teal border on the left and right sides.

# **Addressable Channels**

- **Onstar**
- **Safety Connect**
- **Enform**
- **BMW Assist**

# **ECU Interconnections**

**By accessing one ECU via any means,  
one can gain control of all of the car's systems**

**What could a hacker do?**

- **Disable anti-theft security**
- **Engage the brakes at a specified speed**
- **Turn off the engine**
- **Lock the accelerator**

# **“And it will only get worse”**

- **Completely computer controlled self-driving vehicles**
- **Statutes permitting driverless cars**

# Applicable Laws?

- **Computer Fraud and Abuse Act**
- **DMCA**
- **Trespass to chattel**
- **ECPA (Wiretap Act)**
- **Patriot Act**
- **State eavesdropping statutes**

# **Computer Fraud and Abuse Act**

- **Intentional unauthorized access**
- **Definition of protected computer**



# **Wiretap Act**

- **Intentional interception and disclosure**
- **Wire or electronic communication**

# **DMCA**

- **Anti-circumvention provision as distinct from infringement**
- **Requires effective access control vs. too many access ports**

# Trespass to Chattel

- **Intentional interference with another's property**
- **Identifying the resulting damage**

# **Patriot Act**

- **Law enforcement**
- **Terrorist acts**

# Harmonization

## Proliferation of ECUs brings benefits

- Safety
- Convenience
- Greening of transportation

## Standardization of technology follows

- Harmonization of connections
- But also greater vulnerability

# **New Security Needs**

**New tools to be developed?**

- **Automotive anti-virus software**
- **Automotive anti-spyware programs**

**New meaning to the term "car crash"**



**Contact Information:**

**Richard C. Balough  
Cheryl Dancy Balough  
BALOUGH LAW OFFICES, LLC  
1 N. LaSalle St., Suite 1910  
Chicago, IL 60602  
312.499.0000**

**[www.balough.com](http://www.balough.com)**

**[rbalough@balough.com](mailto:rbalough@balough.com)  
[cbalough@balough.com](mailto:cbalough@balough.com)**