

# Running RDM

November 17, 2007



# Running RDM



- ANSI E1.20-2006, Entertainment Technology - Remote Device Management over USITT DMX512, popularly known as "RDM".
- Extension to the DMX512 protocol to work, but to work reliably there are some rules for network layout that have to be followed.

# Panelists



- Mitch Hefter
  - E1.11 (USITT DMX512-A) Task Group Chair
  - Entertainment Technology, a Genlyte company
- Scott Blair
  - E1.20 RDM Task Group Chair
  - High End Systems
- Javid Butler
  - E1.27-1, -2 (DMX512 Cabling) Task Groups Chair
  - Integrated Theatre
- Milton Davis
  - Doug Fleenor Design
- Peter Willis
  - Howard Eaton Lighting

# USITT DMX512



- DMX512 was developed in 1986 by the Engineering Commission of USITT, with minor revisions in 1990.
- DMX512 has gained international acceptance throughout the entertainment industry.
- Before DMX512
  - Multiple Protocols.
  - “Lowest Common Denominator” needed.
- Implemented on an EIA-485 physical network.

# E1.11 USITT DMX512-A



- Made editorial updates to DMX512 as appropriate.
- Added technical features while maintaining a balance with backward compatibility, including formalizing the management of Alternate START Codes.
- Revision done under the ESTA Technical Standards Program.

# E1.11 USITT DMX512-A



- Simple DMX512 system:
  - console, a dimmer bank, then add Scrollers, distributed dimming, and intelligent lighting, along with the ladder needed for setup and reconfiguring.
- DMX512, except for a few proprietary implementations, is basic control; uses streaming data.



# E1.20, RDM –

## Remote Device Management



- An enhancement to USITT DMX512 for configuration, status monitoring, and management of DMX512 based systems.
- An open standard developed by the ESTA Technical Standards Program that allows interoperability between many Manufacturers.
- Compliant DMX512 and DMX512-A devices are completely functional when RDM is present.

# E1.20 RDM



- “RDM eliminates climbing the truss to change configuration settings and DMX512 addresses . . . .”
- Extends two way communication out to the end of DMX512 wire.
  - ACN works over Ethernet, RDM works over DMX512.
- RDM will help prolong the use of DMX512 in environments where an Ethernet control system is not justified.



# E1.20 RDM



- Allows development of “Universal configuration and monitoring equipment” on DMX512 systems.
- More sophisticated and comprehensive RDM/DMX512 test equipment.

# E1.20 RDM



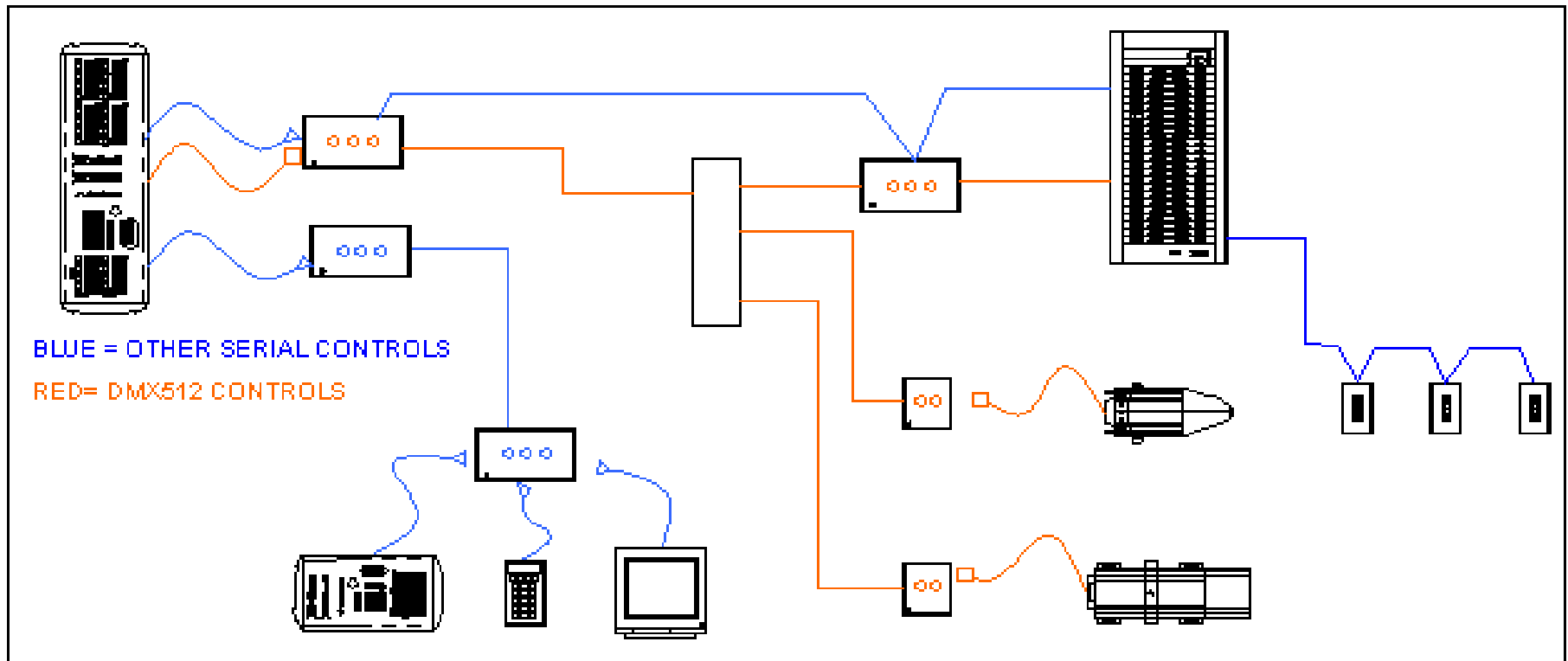
- RDM System - same as DMX512
  - Then add an RDM Monitor / Command processor
  - Remove the ladder.
- RDM gets you remote configuration and device management (available thru some of the DMX512 proprietary implementations).
  - RDM functions are command based, but still run on DMX512's streaming data structure.



# What Does RDM Do?



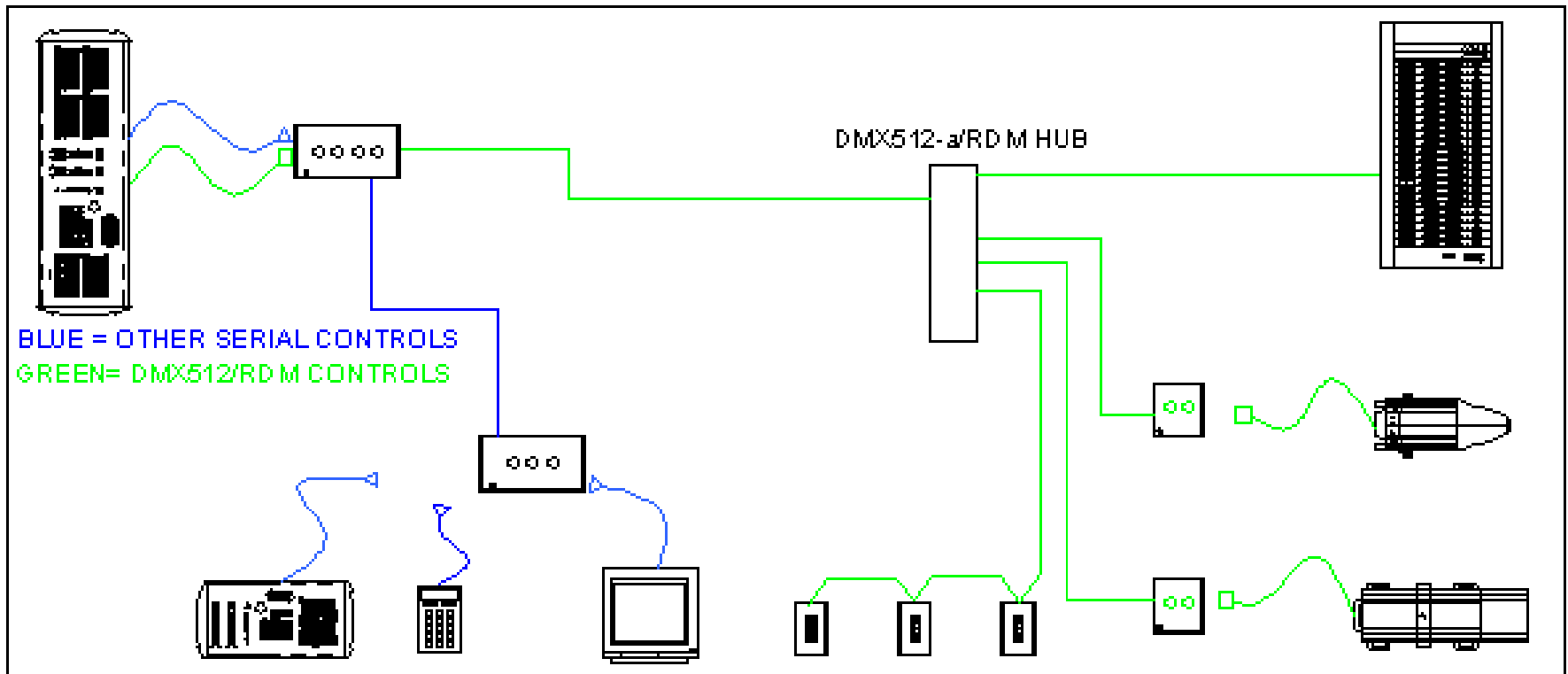
- Today's DMX512 systems "Enhanced" by multiple vendors adds additional wiring and lots of additional devices to operate, maintain and support.



# What Does RDM Do?



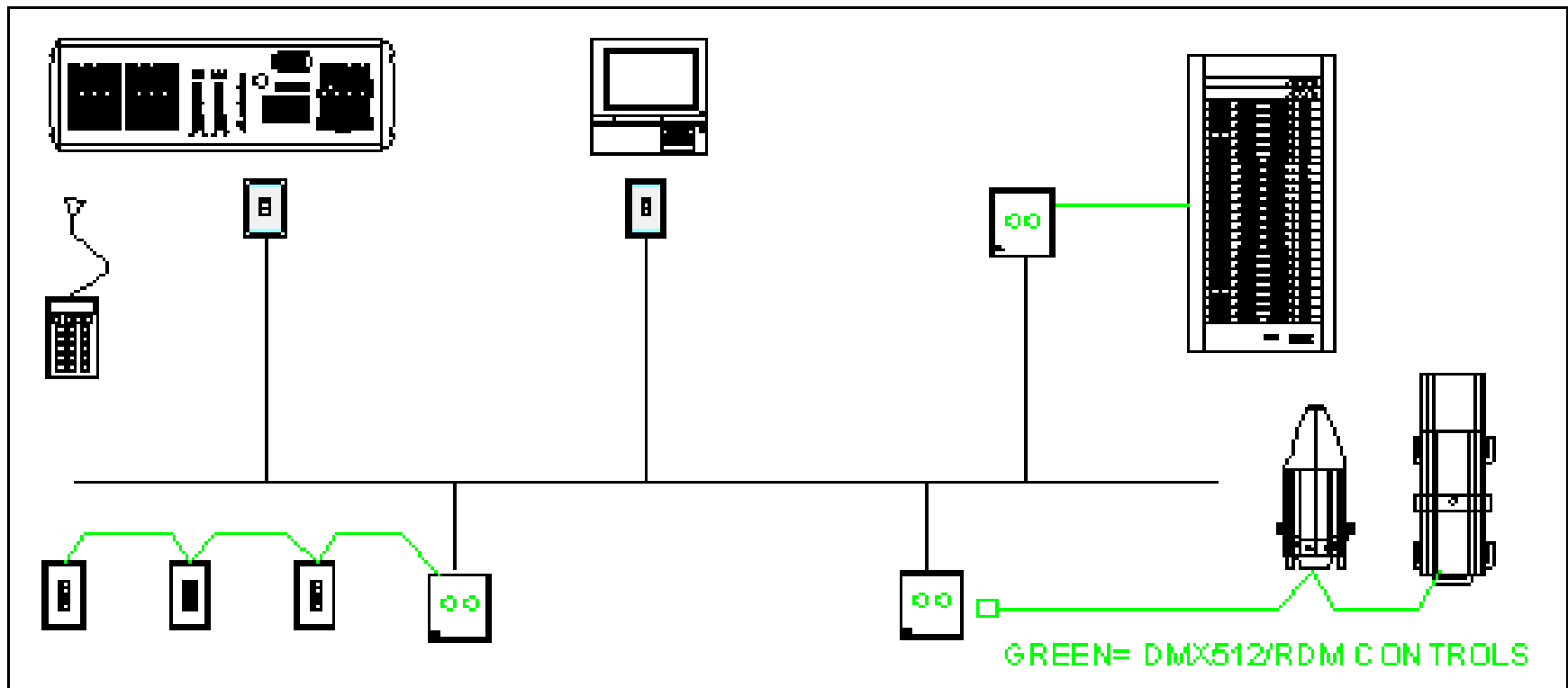
- Adding RDM to today's DMX512 system will reduce the set-up time needed to configure the system and reduce the number of proprietary serial interfaces.



# DMX512-A/RDM to ACN over TCP/IP gateways



- Best way to “future proof” your system architecture. You get all the advantages and low cost of the existing DMX512 device with the flexible, scaleable Ethernet cabling.



# Why Do We Need RDM?



- RDM allows the addition of functions and features to DMX512 based systems.
- Manufacturers get a simple to implement standard feedback/remote configuration protocol.
- Rental houses will have fewer proprietary feedback systems to learn and maintain. RDM will simplify the set-up, maintenance, and repair of rental stock.

# How Does RDM Work?

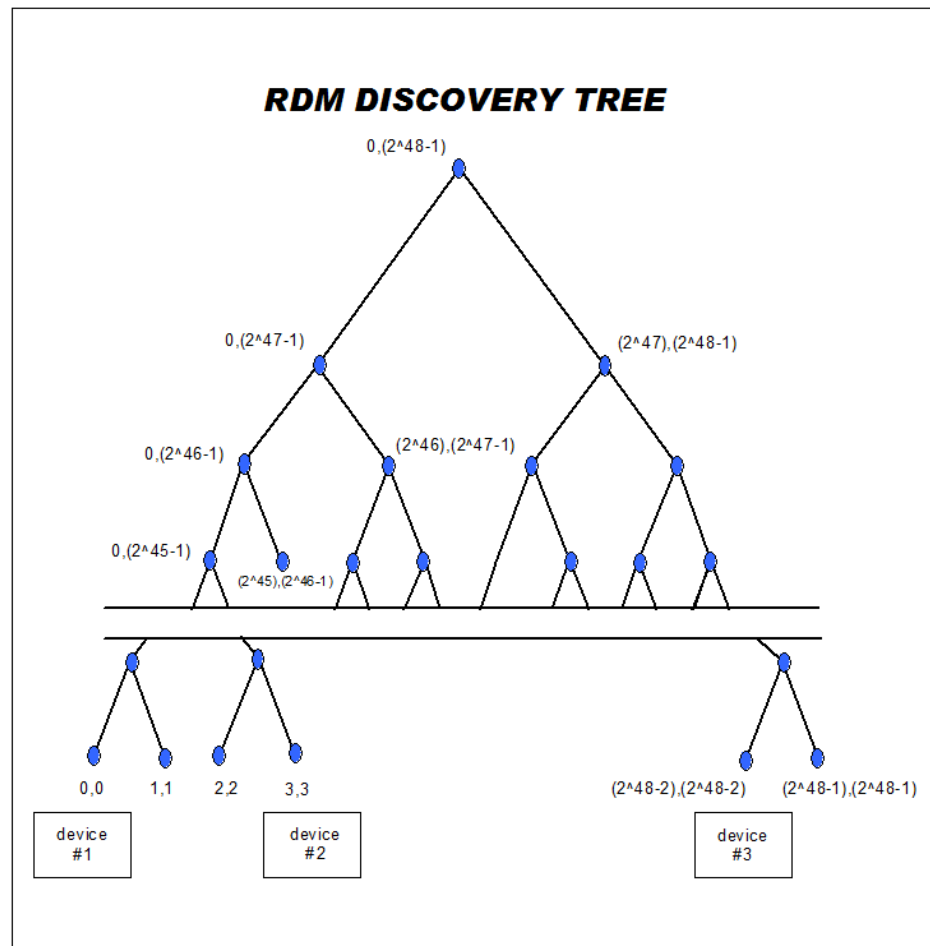


- DISCOVERY PROCESS
- HOW MESSAGING WORKS
- SYSTEM OPERATION AND PERFORMANCE

# RDM DEVICE DISCOVERY



- STEP 1-THE CONTROLLER SENDS OUT DISCOVERY COMMAND

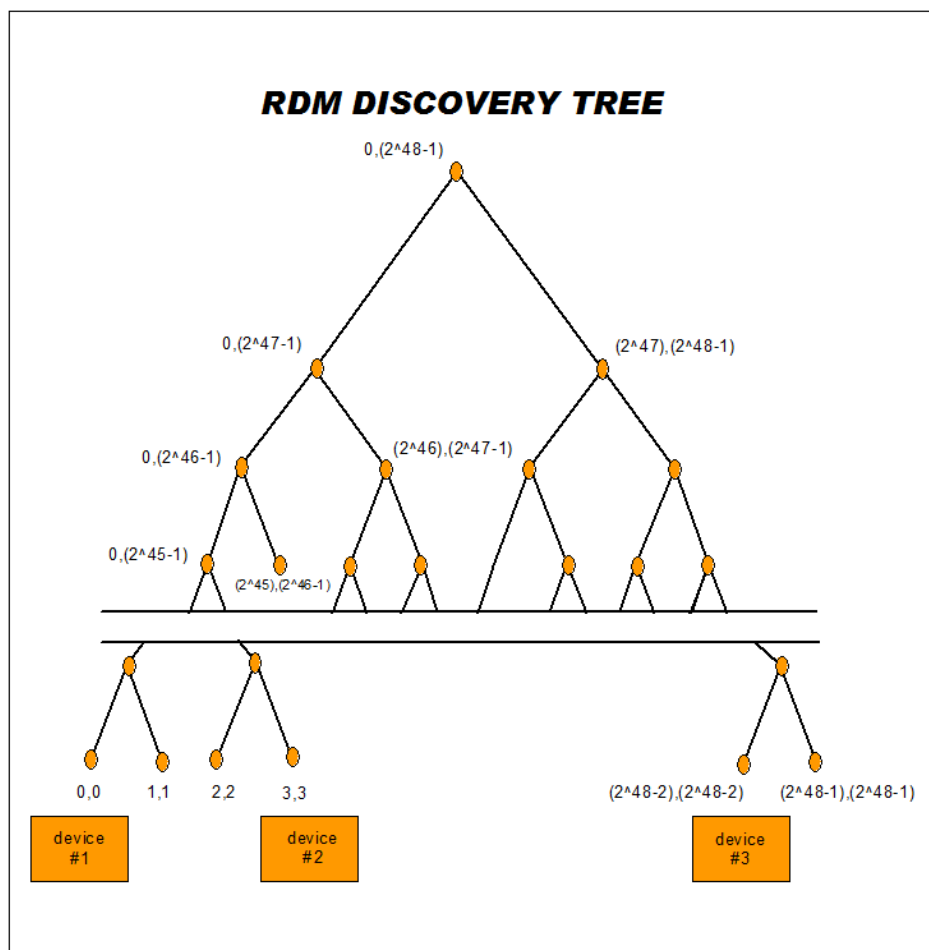




# RDM DEVICE DISCOVERY



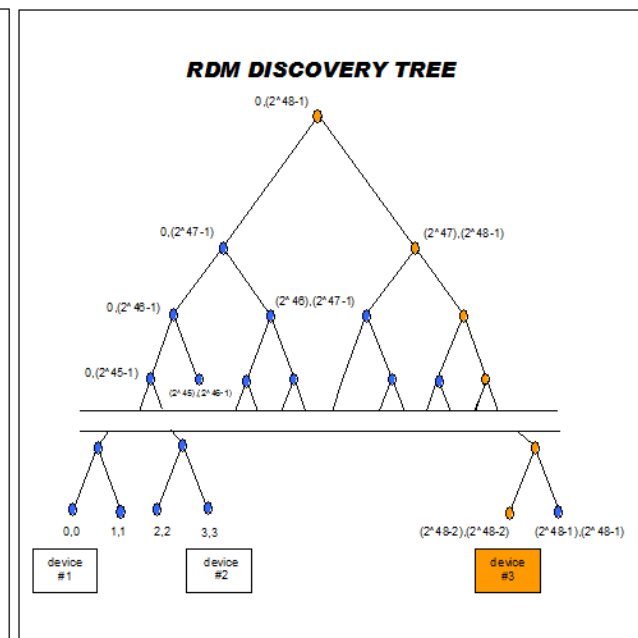
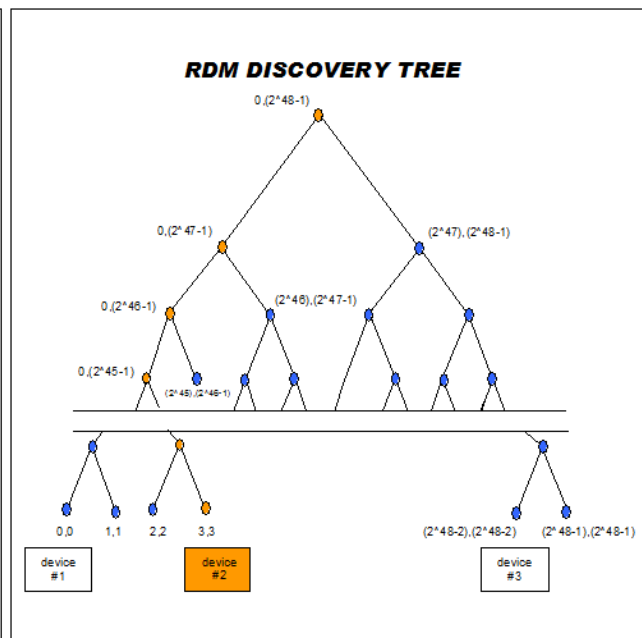
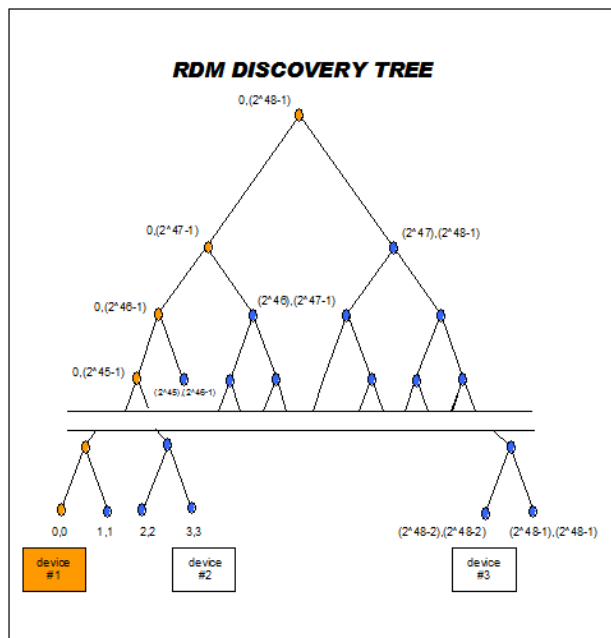
- STEP 2 - ALL RDM DEVICE RESPOND



# RDM DEVICE DISCOVERY



- STEP 3 - THE CONTROLLER GOES DOWN THE BRANCHES OF THE TREE TO FIND THE INDIVIDUAL DEVICES
  - As the controller finds the RDM devices, it mutes them.
  - When the controller can no longer find devices to turn off, discovery is complete.



# How Messaging Works



- Once Discovered, devices can be queried for useful information.
- Large Collection of GET and SET commands that allow access to common configuration options.
  - GET/SET DMX512 Starting Address (Slot)
  - GET DMX512 Slot Footprint
  - GET Device Model Type

# How Messaging Works



- Also GET Commands for operating information.
  - GET Error and Status Messages.
  - GET Sensor which can include Temperature, Voltage, Wattage, Position, etc...
- Manufacturer's can create their own specific Commands as needed also.

# System Operation and Performance



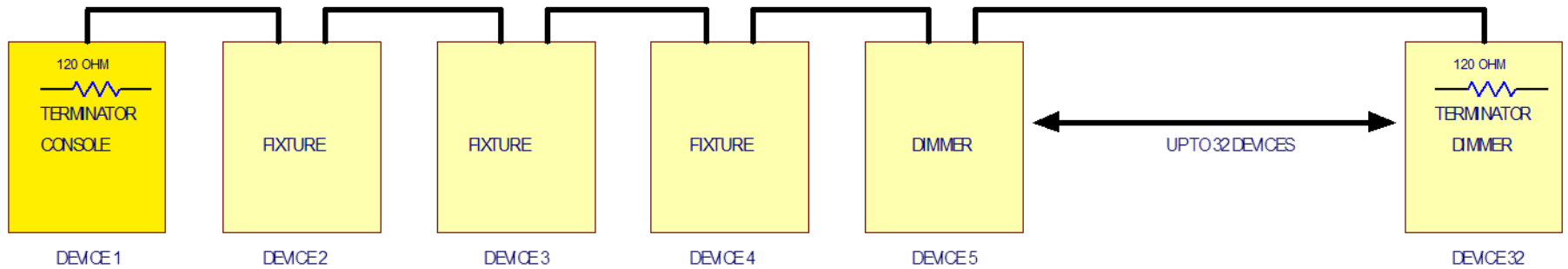
- RDM Alternate START Code packets are interleaved with normal DMX512 packets.
- Can still maintain 32 Hz refresh rate even with RDM Packets between every normal DMX512 Packet.

# Upgrade Path to RDM

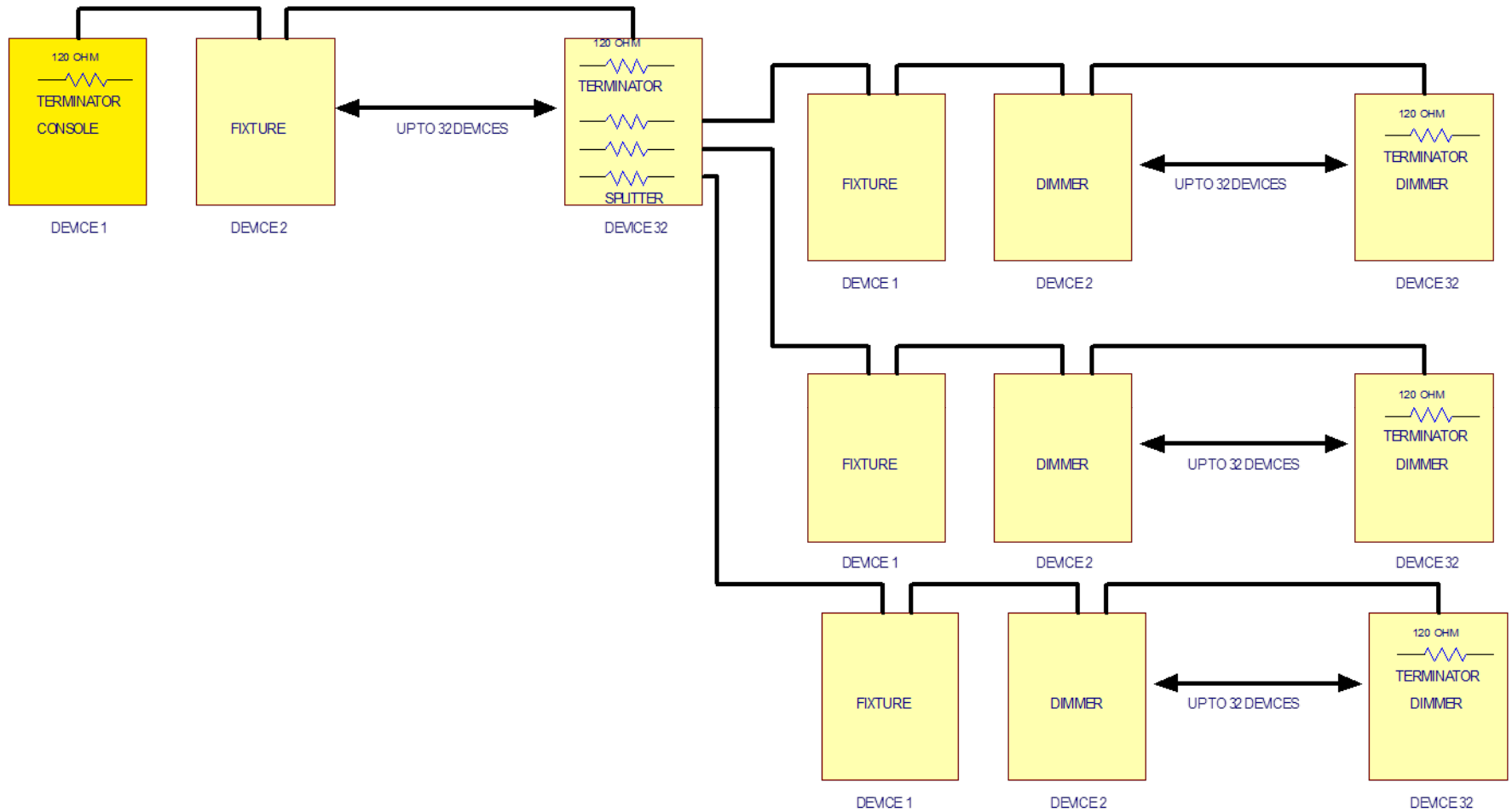


- Manufacturer's can upgrade existing DMX512 product and/or incorporate RDM into new DMX512-A (E1.11) product.
  - Same connector (XLR 5pin) and pinout as DMX512
  - Protocol allows for additional “Manufacturer Manufacturer Specific” commands

# Basic DMX/RDM Infrastructure



# Advanced Infrastructures





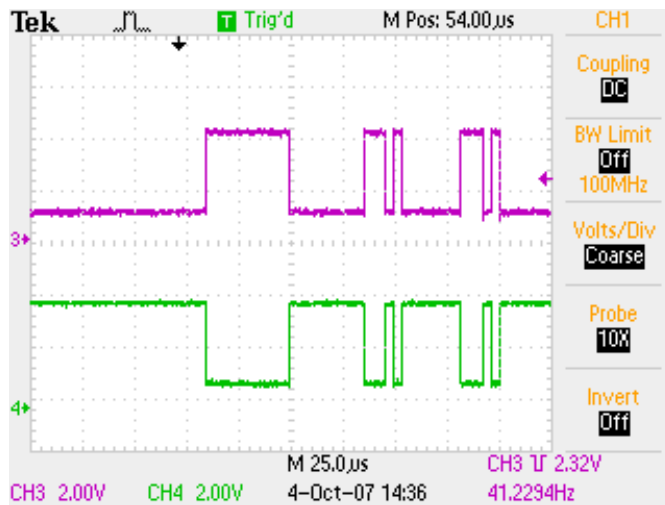
# RJ-45 Connectors



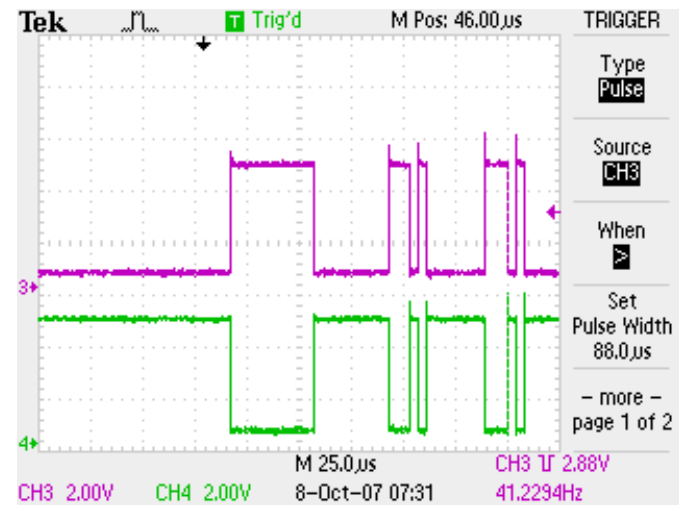
- The use of RJ-45 connectors for portable DMX/RDM is prohibited.



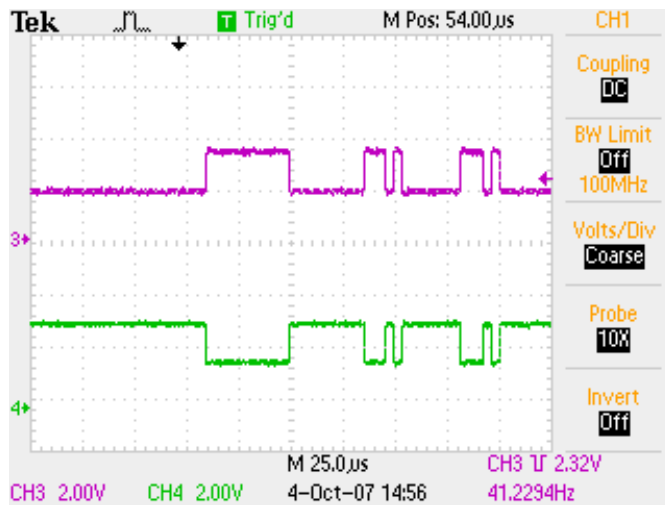
# Effects of Termination



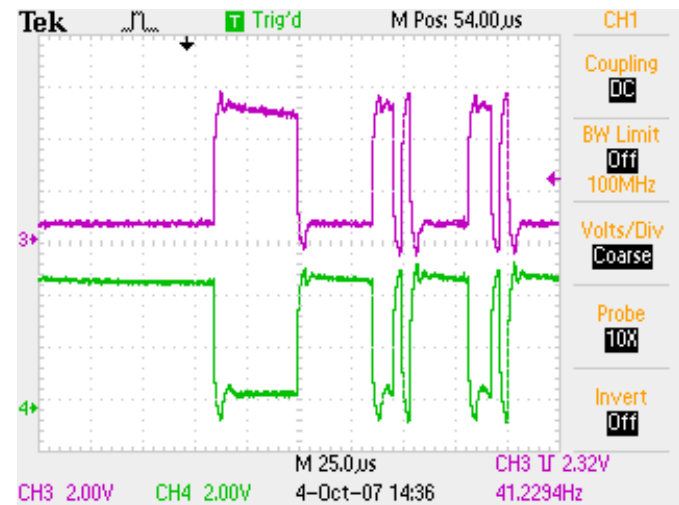
Short cable, terminated



Short cable, un-terminated



Long cable, terminated



Long cable, Un-terminated

# Keys to Upgrading to RDM



- A ***properly designed and installed*** DMX512 system will work with RDM
- “T”, “Y”, and “star” wiring configurations are not allowed; daisy chain wiring is required
- Cable type, system design, and termination become more important in RDM
- Non-compliant legacy equipment may need to be protected from RDM data packets

# Older DMX512 Systems



- 1986 DMX512
- Permanent Install
  - May use EIA-422 cable
  - May not be daisy-chained
  - May not have proper termination
- Portable Cables
  - May be microphone cable



# Upgrade Checklist



- Safety First!
- Check existing data runs
  - Construction As-Built drawings
  - System manufacturer's drawings
- Check existing data cable
  - What cable is wired to back of XLRs?
  - Look up cable spec sheet on line
  - EIA-422 cable will work with RDM, but may not allow as long a run as EIA-485 cable
- Check termination
  - Is termination switch on dimmer rack engaged?

# Portable RDM Cables



- E1.27-1 cable will work with RDM
  - Marked E1.27-1 on both ends for cables longer than 6'
  - Violet band means only pins 1-3 are wired through, but cable will still work with RDM
  - 5-pin XLRs will work with all DMX512-A RDM equipment-no more 3-to-5 pin adaptors required
  - All pins are wired straight through-no pin swapping adaptors required
- Microphone cable will **not** work
  - Wrong characteristics severely limit length by distorting signals

# New RDM systems



- Install according to E1.27-2
  - Will work with RDM or DMX512 EF2 protocols
  - Compliant installations must be daisy-chained
  - Cable types will work with RDM
    - EIA-422 cables still allowed, so plan for shorter run lengths or places where distribution amplifiers can be added
- Factors affecting maximum cable length
  - Number of devices
  - Number of connections
  - Environment-sources of interference

# Cable Lengths: How Long is OK?



- The DMX512-A Standard says:
  - “Cable requirements and premises wiring are not within the scope of this standard.”
- The Cabling Standard says:
  - “It is beyond the scope of this standard to determine a maximum run length that will apply to all possible installations.”
- What usually works:
  - Up to 1,000 or 1,500 feet will work with RDM in most cases.



# Interoperability Pavilion





QUESTIONS?

# Running RDM



# End

