Running RDM

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Technical Standards Program

ESTA

The New Standard for Innovation

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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

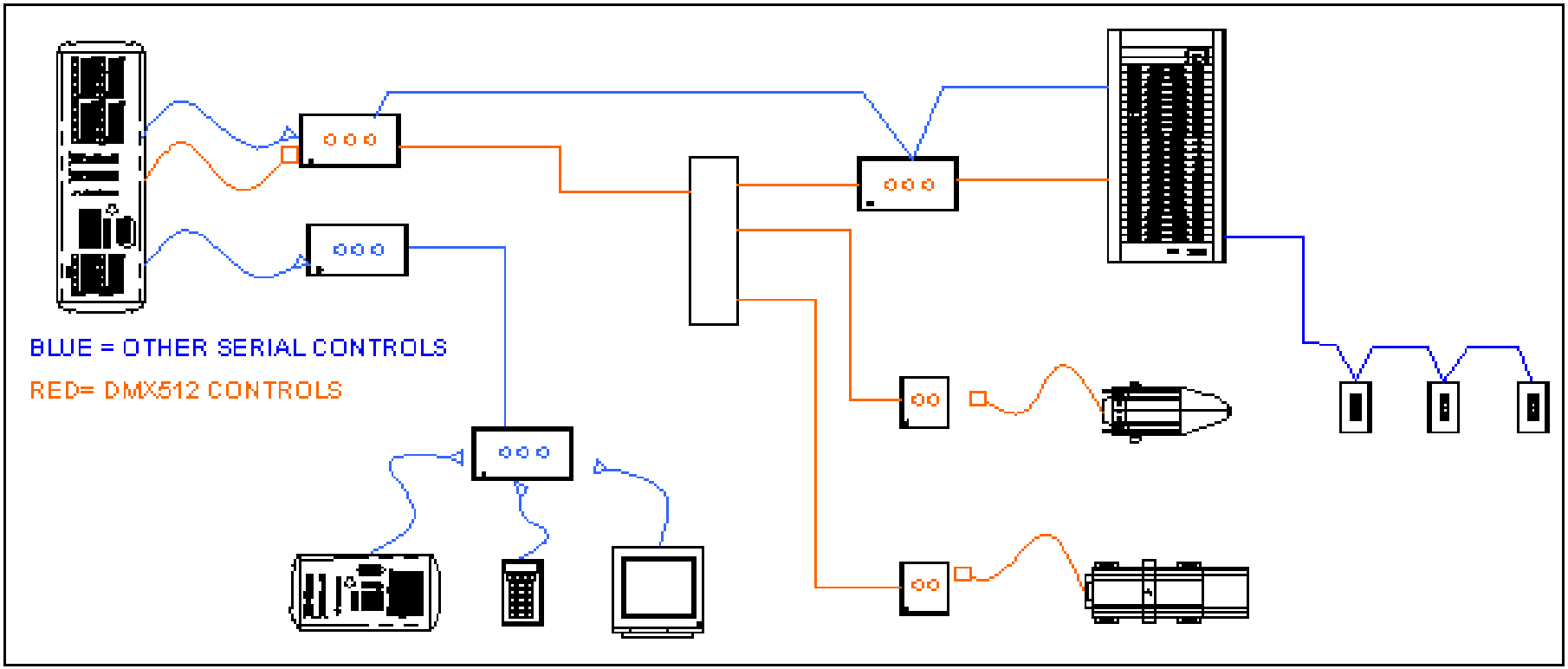
- Allows development of “Universal configuration and monitoring equipment” on DMX512 systems.
- More sophisticated and comprehensive RDM/DMX512 test equipment.

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.

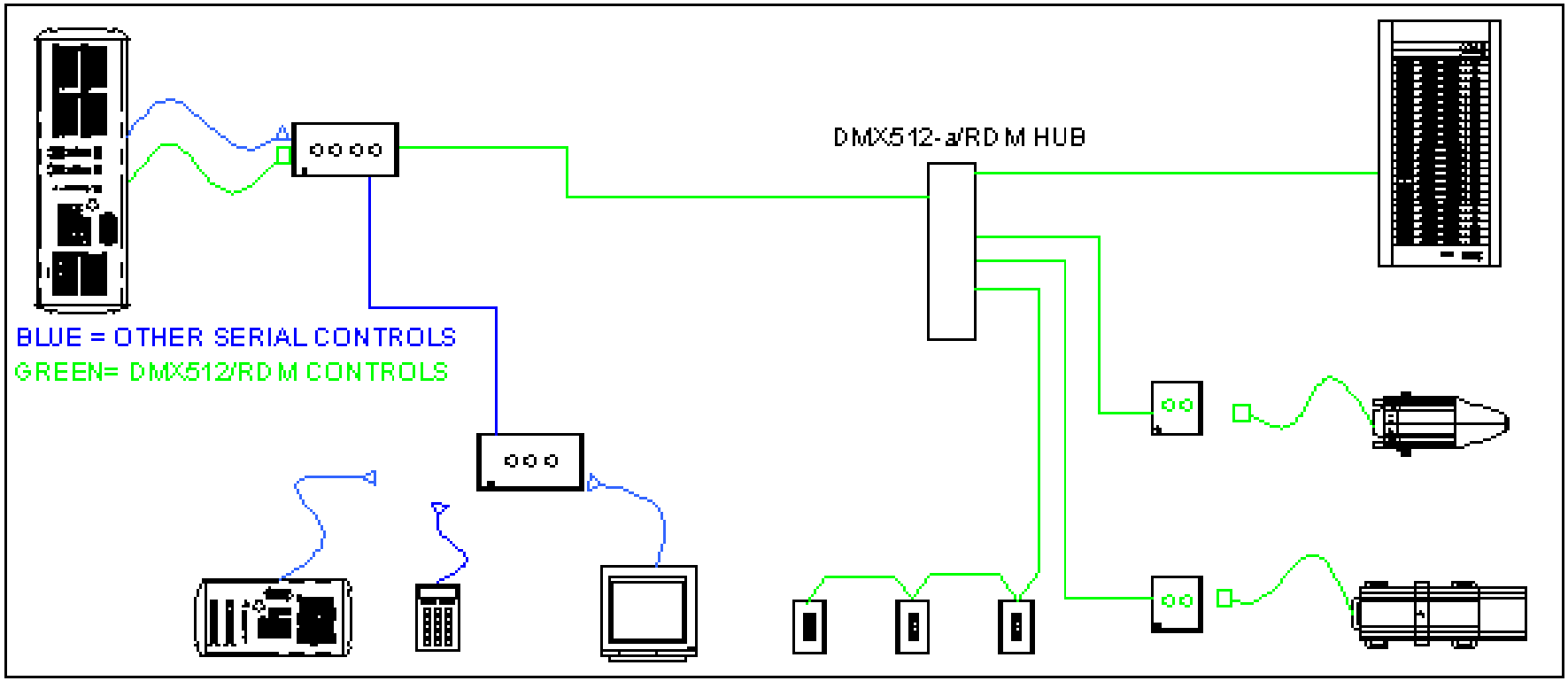
What Does RDM Do?

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



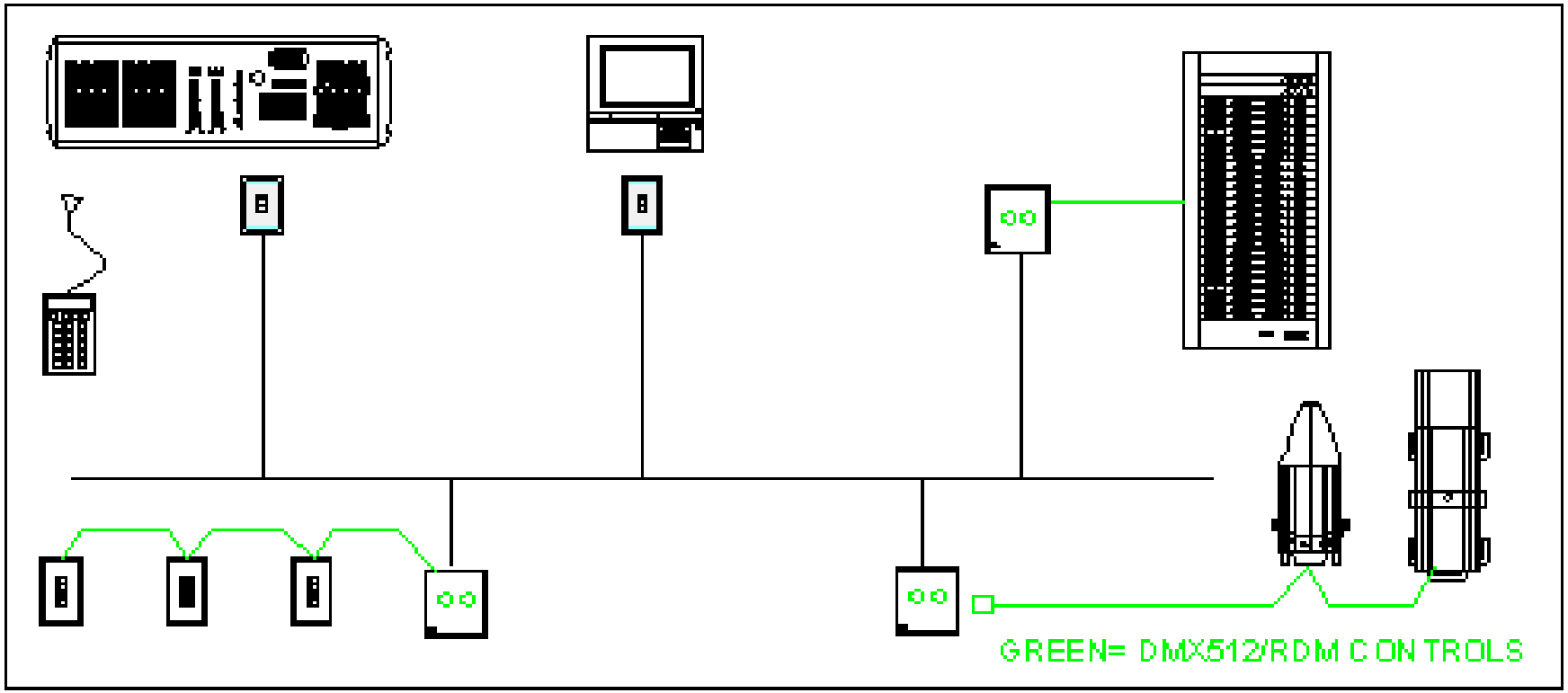
What Does RDM Do?

- 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.

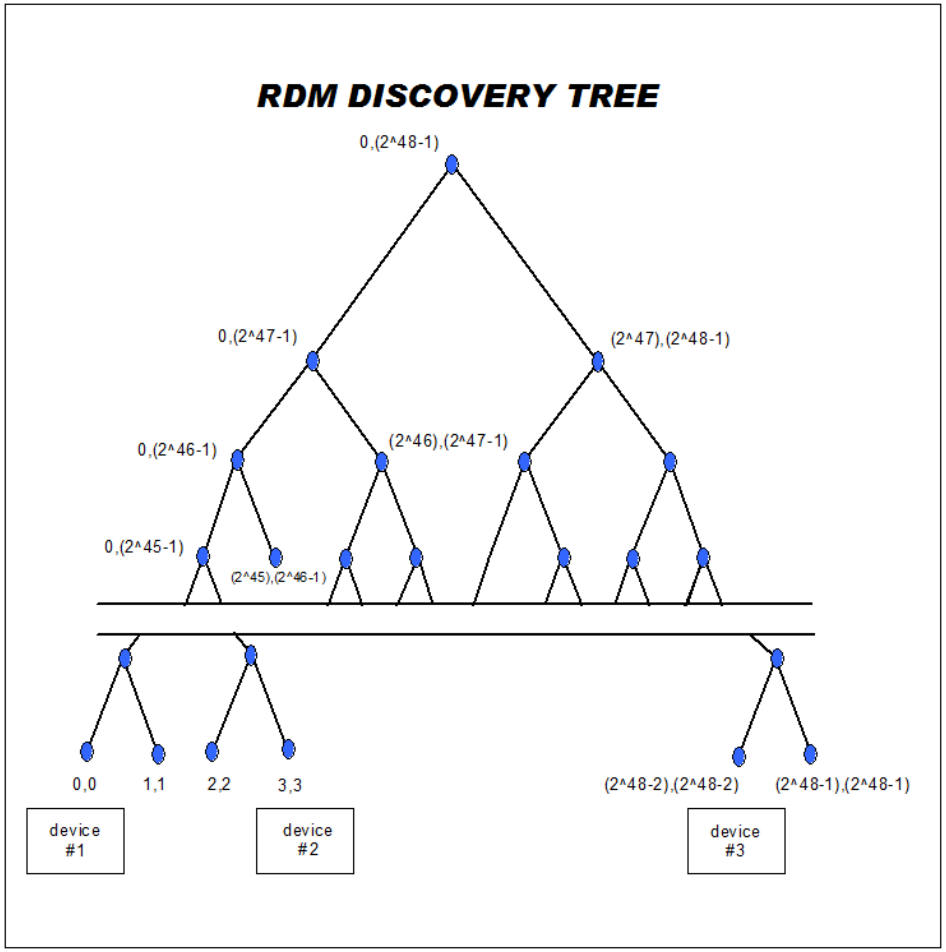
- Rental houses will have fewer proprietary feedback systems to learn and maintain. RDM will simplify the set-up, maintenance, and repair of rental stock.

How Does RDM Work?

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

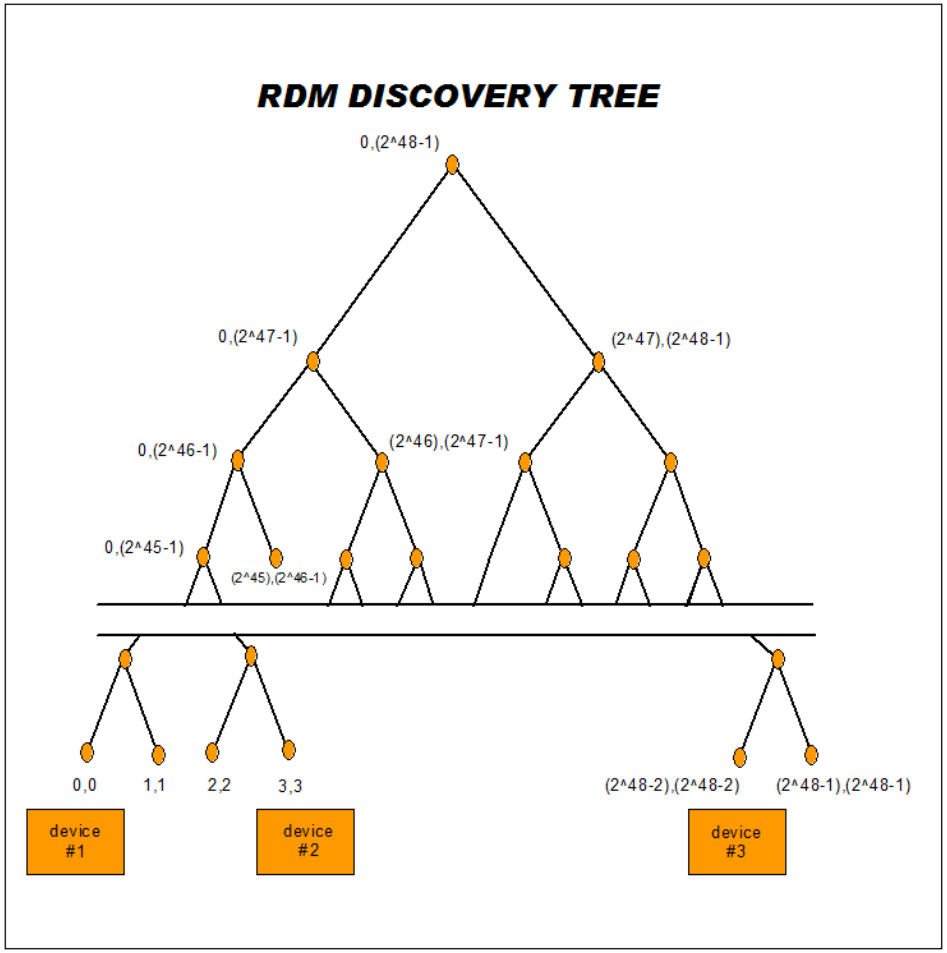
RDM DEVICE DISCOVERY

- STEP 1-THE CONTROLLER SENDS OUT DISCOVERY COMMAND



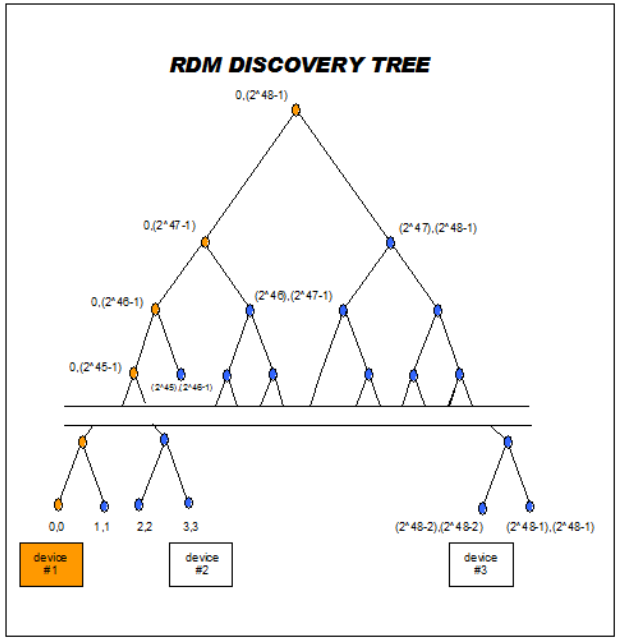
RDM DEVICE DISCOVERY

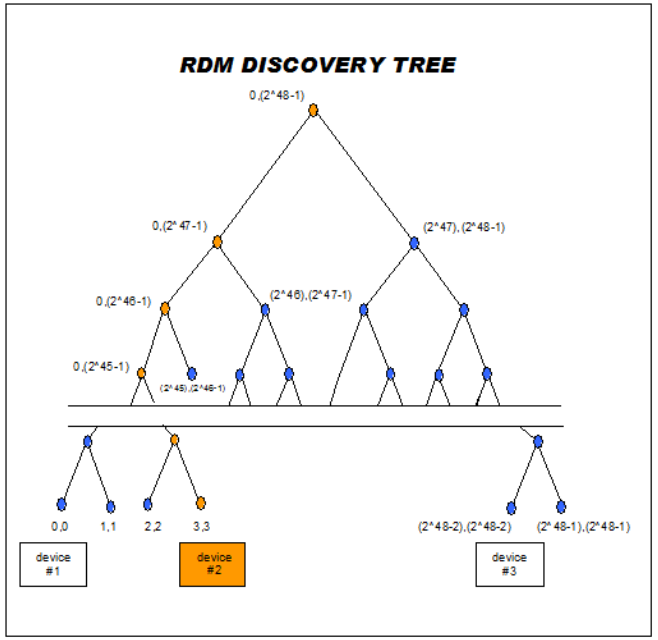
- STEP 2 - ALL RDM DEVICES RESPOND

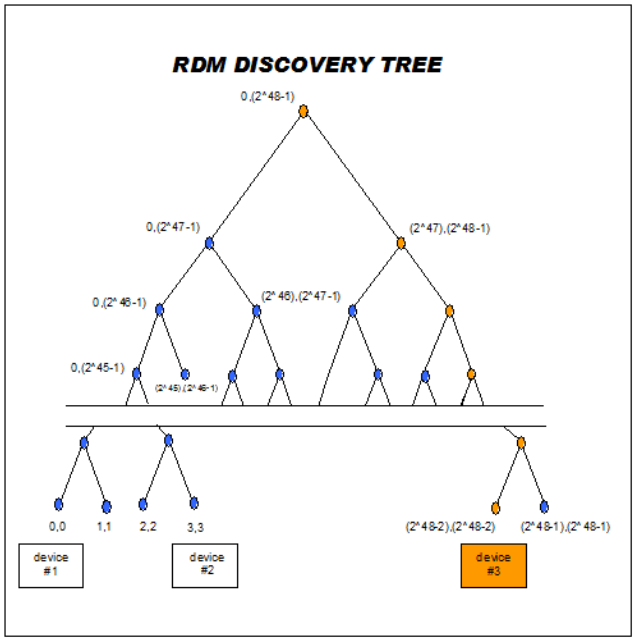


RDM DEVICE DISCOVERY

- STEP 3 - THE CONTROLLER GOES DOWN THE BRANCES 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

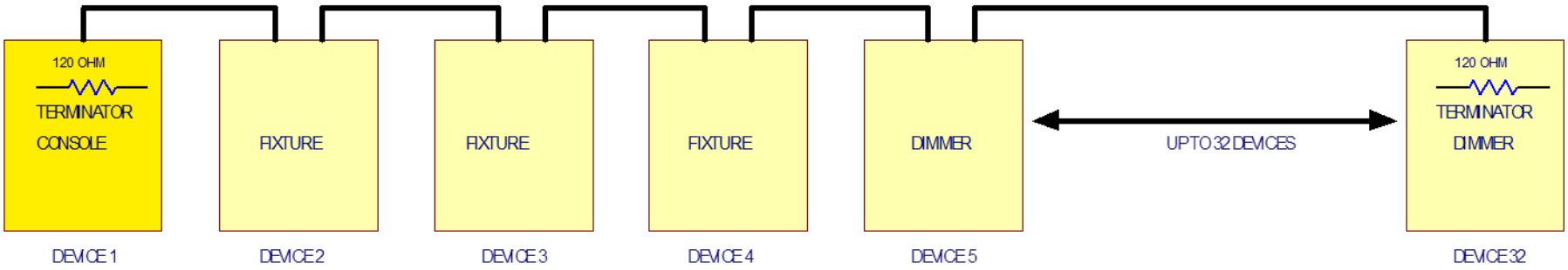
- RDM Alternate START Code packets are interleaved with normal DMX512 packets.

- Can still maintain 32 Hz refresh rate even with RDM Packets between every normal DMX512 Packet.

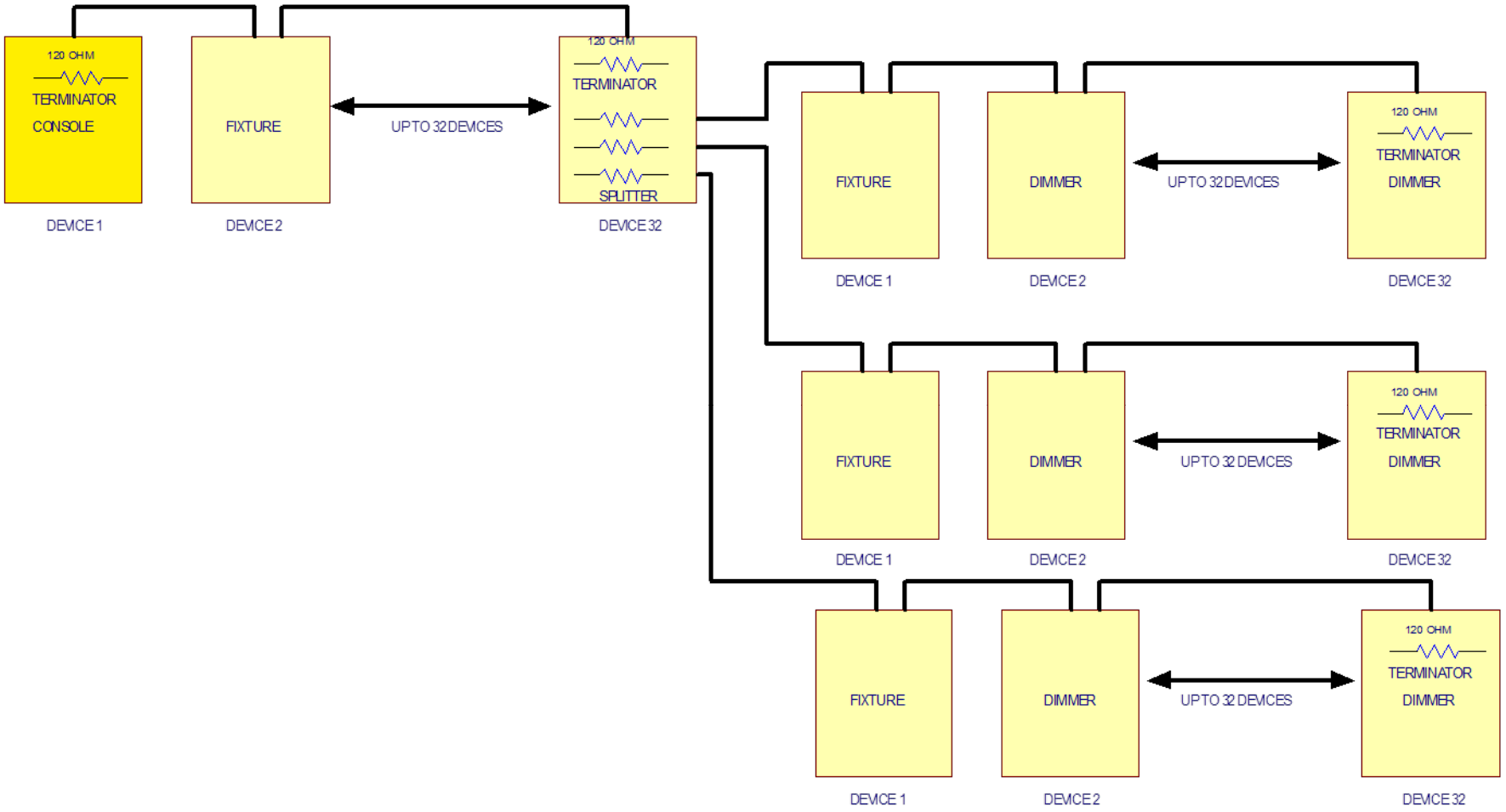
Upgrade Path to RDM

- 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



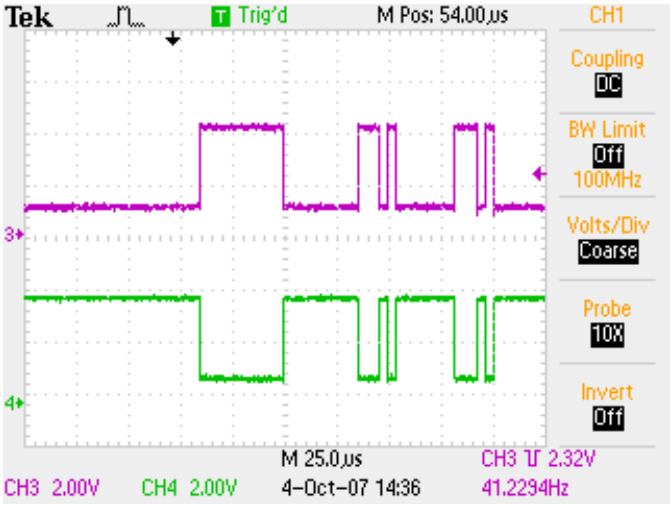
Advanced Infrastructures



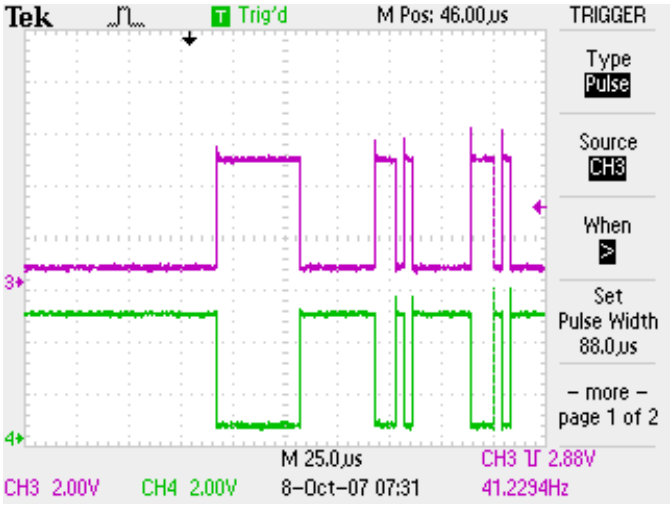
RJ-45 Connectors

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

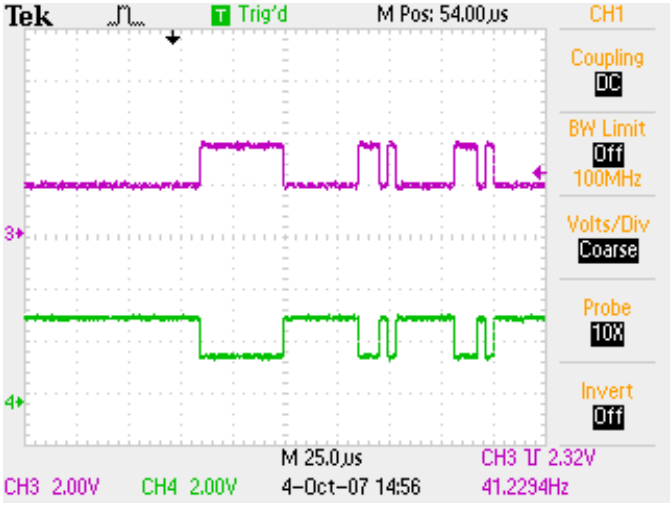
Effects of Termination



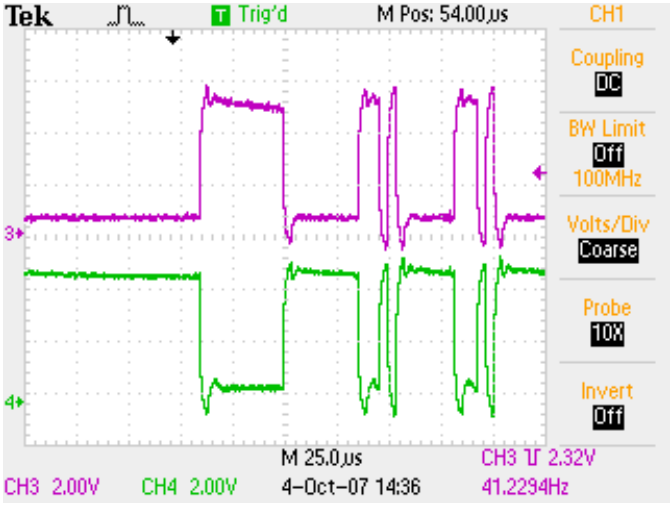
Short cable, terminated



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 severly 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

Technical Standards Program

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