NETWORK CONFIGURATION GUIDE

NETWORK DATA BOX
&
NETWORK EFFECTS CONTROLLER

NDB & NEC USER GUIDE #2

Presented by

Minleon International

Your provider of cutting edge LED lighting products

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NEC: NETWORK CONFIGURATION GUIDE
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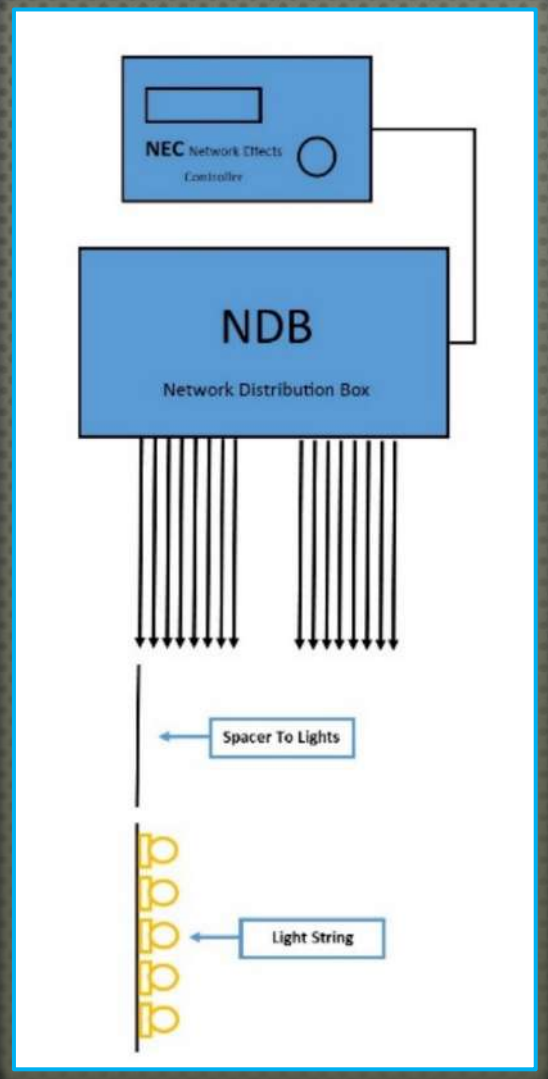
A basic network diagram of the NEC system



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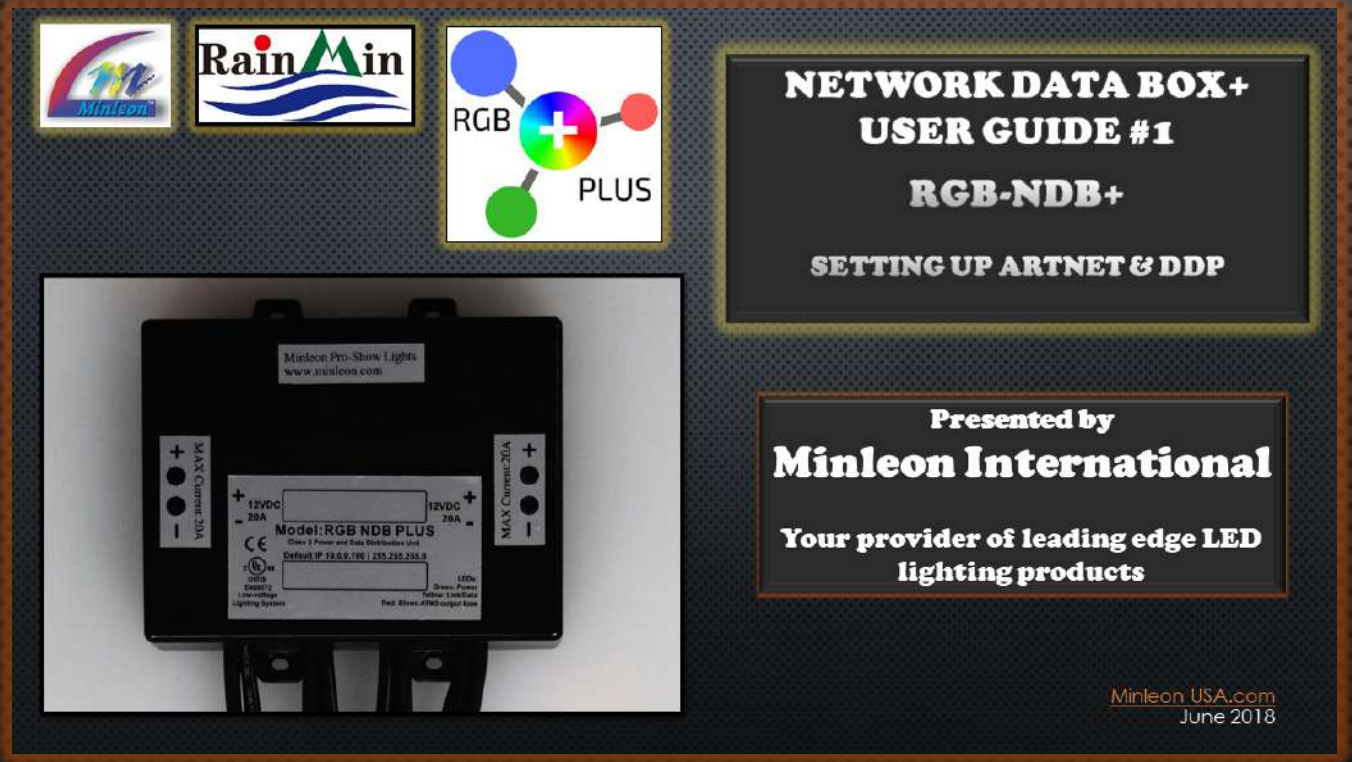
NEC: NETWORK CONFIGURATION GUIDE
THE NDB

NDB'S PROVIDE THE RGB LIGHT OUTPUTS FOR THE NEC. EACH NEC CAN SEND COMMANDS TO UP TO 16 NDB'S. THE SYSTEM IS CONNECTED WITH THIRD PARTY CAT 5/6 ETHERNET CABLE & A NETWORK SWITCH.



This tutorial will focus on the network connections between the NEC & NDB.

For manual configuration of the NDB for ArtNet, along with efficient limits when connecting lights, please refer to the '*NDB+ User Guide*' part 1.

NEC: NETWORK CONFIGURATION GUIDE
LIGHT COUNT

As with all Minleon RGB Controllers, the user must tell the NEC how many lights we want it to control.

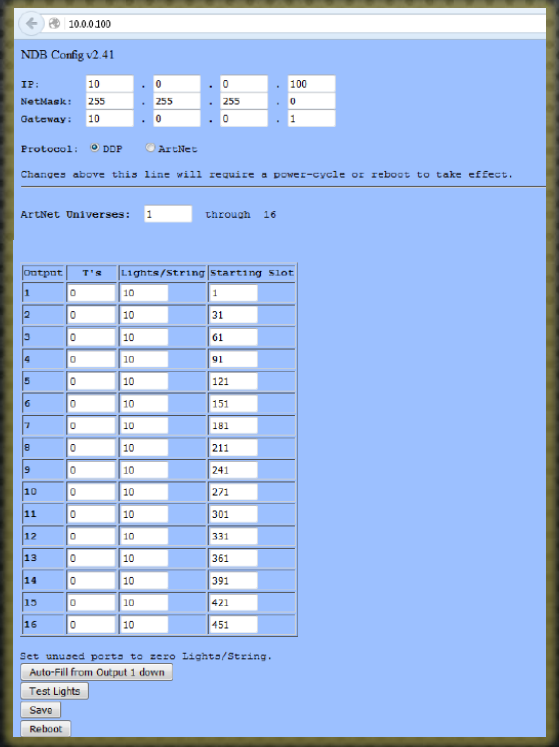
We must also ensure that the accessories are wired properly so that the controllers can command the RGB pixels.

Note: Most issues with RGB pixels not functioning properly can be corrected by double checking both the controller (or light desk) configuration, light count, PSU limits & the wiring diagram.

NEC: NETWORK CONFIGURATION GUIDE
AUTO-CONFIGURE VS. MANUAL CONFIGURATION

NEC Display

- Operating Mode Utilities
- AutoConfig NDBs Push to Begin



NDB Network Interface for custom, Manual Configs.

The NEC has a time-saving Auto-Configuration option in the *Utilities Menu*.

- If the Output Assignments of your light design are equal among NDB outputs, choose Auto-Configure

Note: The last NDB can have fewer lights, but should be close in light count to the others for the effects to display properly.

- If you have a **custom design** with different amounts of lights among NDB outputs, log into each NDB's network interface (10.0.0.100 default IP address) and manually input the correct values (see blue screen shot at left)

Note: If employed first, Auto-Config will override the NDB's default IP address of 10.0.0.100. (More on Slide #9. Also refer to the *NDB User Guide* for how to restore NDB factory defaults.)

NEC: NETWORK CONFIGURATION GUIDE
AUTO CONFIGURATION

EASILY & QUICKLY AUTO-CONFIGURE NDB IP-ADDRESSES, NETMASK, GATEWAY, SEND-TO ADDRESS & OUTPUTS WITH THE NEC.
Auto-configure will not identify the number of RGB's or Smart T's. These need to be entered manually.

NEC Display

- NEC# 1
- Outputs per NDB 12
- Total Strings 36
- T's per Output 3
- Lights/String 25
- Begin AutoConf Push to Start

STEPS:

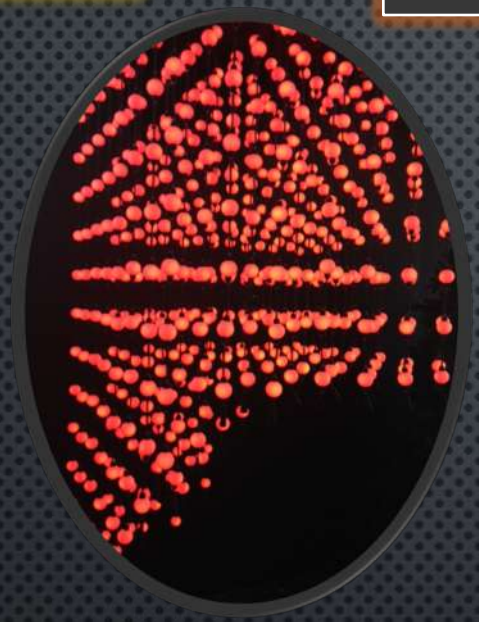
1. FROM THE NEC'S **MAIN MENU** SELECT **OPERATING MODE**, THEN **UTILITIES** (GRAPHIC ON PREVIOUS SLIDE)
2. SELECT "**BEGIN AUTOCONFIG NDB'S**"
3. **NEC #:** REFERS TO NEC IN YOUR HAND. IF THIS IS THE FIRST IN YOUR NETWORK, SELECT '1'
4. **TOTAL STRINGS**: # OF STRINGS PER OUTPUT & CONNECTED TO SMART T'S (IF YOU HAVE 3 SMART T'S PER OUTPUT & 12 OUTPUTS, THIS NUMBER IS 36)
5. SET **LIGHTS PER STRING**
6. SET **OUTPUTS PER NDB**
7. SET **T'S PER OUTPUT***
8. **PUSH TO START AUTOCONFIG**

*THIS REFERS TO SMART T'S.

NEC: NETWORK CONFIGURATION GUIDE
AUTO CONFIGURATION (CONT.)

Pick NDB #1
Scanning…WAIT

AUTO-CONFIG IS USEFUL IN DISPLAYS WITH **MULTIPLE NDB'S.**



Red lights show that the NEC has recognized these lights on the network.

White lights signal the user is assigning these lights to the selected NDB; Blue lights confirm the assignment.

9. ALL RGB'S ON THE NETWORK SHOULD TURN **RED**, CONFIRMING THE NEC HAS RECOGNIZED THEM.
10. **TURN** THE KNOB UNTIL THE LIGHTS ON THE NDB YOU WOULD LIKE TO ASSIGN AS #1 TURN **WHITE.**
11. **PRESS** THE KNOB A SECOND TIME; THE RGB'S WILL TURN **BLUE**, CONFIRMING YOUR FIRST NDB ASSIGNMENT (**10.0.1.101**).
12. REPEAT STEPS 9-11 FOR ADDITIONAL NDB'S.

NOTE: CHANGES THE USER MAKES IN *UTILITIES MODE* WILL BE CARRIED OVER INTO THE OTHER NEC MODES (EFFECTS PLAYER, SLAVE MODE, FILE PLAYER, ETC.)

NEC: NETWORK CONFIGURATION GUIDE
NDB CONFIGURATION

PRO TIP: WHEN USING THE NEC AS AN EFFECTS OR FILE PLAYER, THE CONFIGURATION OF MULTIPLE NDBS MUST BE THE SAME (EXCEPT FOR THE LAST NDB WHICH CAN HAVE LESS LIGHTS)

- FOR EXAMPLE, IF YOU HAVE 40 LIGHT STRINGS, YOU CAN PUT 16 ON NDB1, 16 ON NDB2, AND THE REMAINING 8 ON NDB3
- OR YOU COULD PUT 10 EACH ON 4 NDBS
- BUT YOU CAN'T PUT 15 ON NDB1, 10 ON NDB2, AND 15 ON NDB3

NEC: NETWORK CONFIGURATION GUIDE
NEC & NDB IP ASSIGNMENTS

These charts show the default IP assignments the NEC uses when **Auto-Configuring** multiple NEC's & NDB's.

NEC #	Assigned IP Address
NEC 1	10.0.1.21
NEC 2	10.0.2.21
NEC 3	10.0.3.21

NDB's assigned to NEC 1	Assigned IP Address
NDB 1	10.0.1.101
NDB 2	10.0.1.102
NDB 3	10.0.1.103
NDB 4	10.0.1.104
NDB 5	10.0.1.105

- The NEC # assigned in AutoConfig is reflected in the third field

- NDBs are numbered from 101 to 116, in the fourth field
- The NEC is shipped with an IP Address ("Our Address") of **10.0.0.21** (A Factory Reset can be achieved in the Utilities Menu.)
- The NDB's factory default is **10.0.0.100**
- All NDB's connected to a single NEC is called a **Cluster,** and will share the same value in the third field
- A cluster might be addressed as: NEC 10.0.3.21, NDB1 10.0.3.101, NDB2 10.0.3.102, NDB3 10.0.3.103…

NEC: NETWORK CONFIGURATION GUIDE
MODE "SETUP" MENUS

Network Setup
Push to Config

Our Addr
10. 0. 0. 21

Setup
Size 10x25

(Refers to 10 stings x 25 lights.)

Flip Strings
No

Flip Lights
Yes

Intensity
90%

THE NEC'S IP ADDRESS, NETMASK, GATEWAY & SEND TO ADDRESS ALSO CAN BE MANUALLY CHANGED IN THE "***NETWORK SETUP***" MENU UNDER THE OPERATING MODE YOU ARE USING.

THE "***SETUP MENU***" UNDER EACH OPERATING MODE IS HANDY AS A QUICK, VISUAL REFERENCE TO YOUR LIGHT DESIGN CONFIGURATION.

IN THE "***SETUP MENU***" WE HAVE THE OPTION TO FLIP STRINGS (MAKE THE LAST STRING FIRST & VICE VERSA), FLIP LIGHTS (MAKE THE LAST LIGHT ON EACH STRING THE FIRST LIGHT, AND SO ON) & DIM OR BRIGHTEN THE OVERALL PIXEL INTENSITY.

PRO TIP: IF YOU ARE STUCK WITH AN UNDERPOWERED LIGHT DESIGN & DESPERATE FOR A QUICK FIX SOLUTION, REDUCING THE INTENSITY MAY BE A VIABLE OPTION.

NEC: NETWORK CONFIGURATION GUIDE
BASIC NETWORK SET UP

Optional Art Net console (via NEC DMX In port)

1- Amp PSU

CAT 5/6 from NEC Network port to NDB

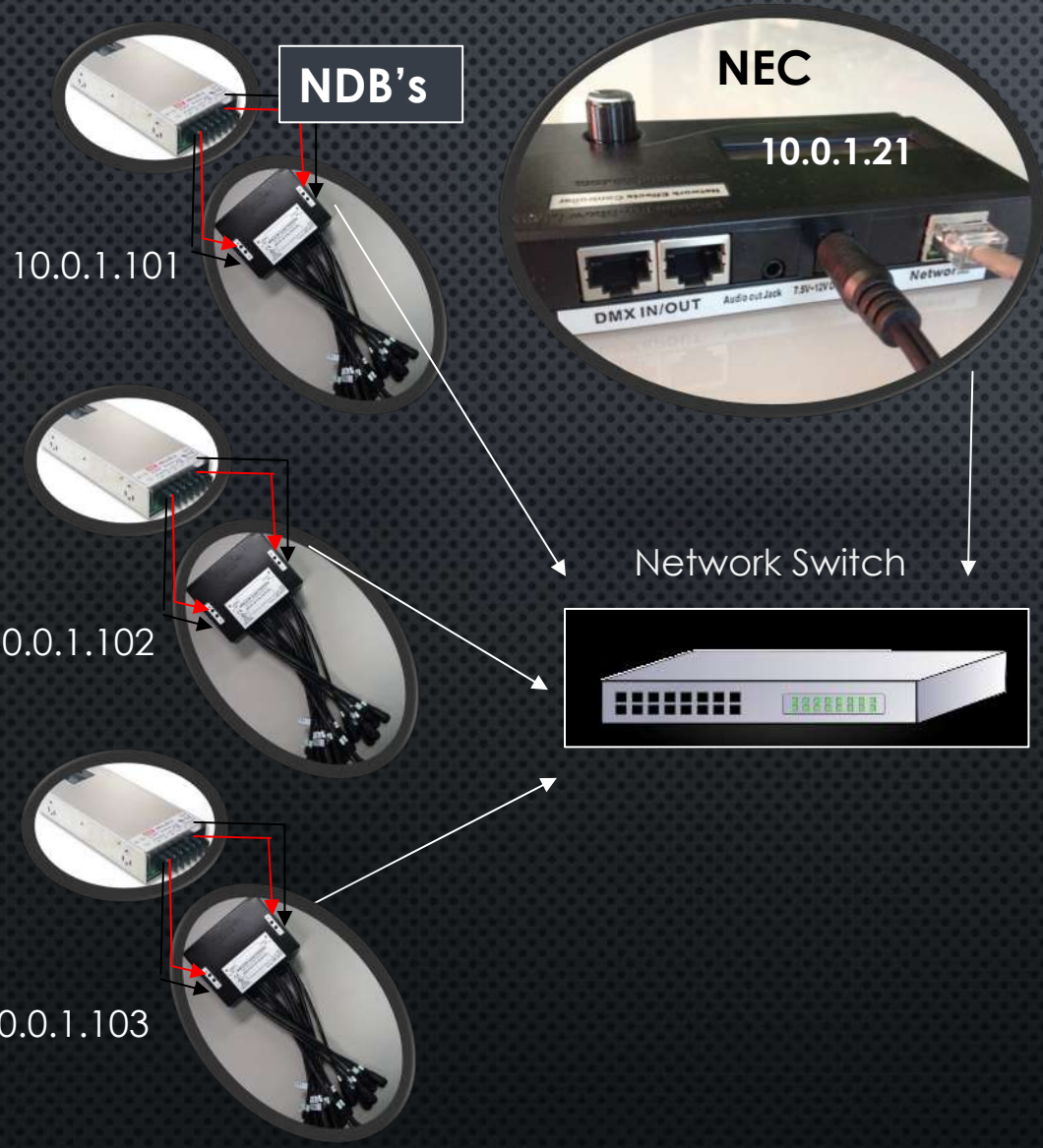
12VDC ≤ 40-amp PSU

Outputs to RGB lights.

1. NEC powered by a 7.5-12VDC, 1-amp power supply (included).
2. Connect NEC to NDB via CAT 5/6 Ethernet network cable from the Network Output Port.
3. NDB powered by a 12VDC, 10- to 40-amp power supply, connected on both sides.
4. RGB strings are connected beginning with NDB output #1

Pro Tip: The NEC can connect directly to an Art-Net console, for live control. Refer to the "*NEC – DMX Triggering Guide*" for details.

NEC: NETWORK CONFIGURATION GUIDE
ADVANCED NETWORK SET UP – MULTIPLE NDB'S



NDB's can efficiently run approximately 900-1100 lights. Projects with more lights, such as Mega-Trees, Light Tunnels, Grids & Chandeliers require multiple NDB's.

- NEC's need to be connected to NDB's via a 100MB Ethernet connection
- Multiple NDB's can be connected to the NEC through a standard, third party, Ethernet/Network switch
- The NEC also connects to the Net Switch from its Network Port, via CAT 5/6 cable
- Each NDB requires a unique IP address on the network
- Each NDB requires its own power supply
- An NEC can send data to up to 16 NDBs
- We call all NDB's connected to the same NEC, a cluster
- Clusters can be synchronized to form larger systems (Slides 13-17)

NEC: NETWORK CONFIGURATION GUIDE
MULTIPLE NETWORK SWITCHES

ONE NEC CAN CONTROL MAX OF 8,000L & SUPPORT 16 NDB'S, BUT NOT ALL NETWORK SWITCHES HAVE ENOUGH PORTS TO SUPPORT SUCH A LIGHT DESIGN. SO WE NEED TO CONNECT TWO SWITCHES WITH A CAT 5/6 NETWORK CABLE.

PRO TIP: SELECT A NETWORK SWITCH SUITABLE FOR BOTH THE CLIMATE OF YOUR SHOW & SUPPORTING THE DATA YOU PLAN TO PUSH THROUGH IT.

- IF YOU NEED TO CONTROL MORE LIGHTS, YOU WILL NEED ANOTHER NEC (SET TO SLAVE MODE, SEE SLIDE 15)
- IN A NETWORK CLUSTER CONFIG., IF THE LIGHT COUNT IS UNDER 8,000L YOU ONLY NEED 1 NEC, NOT 1 NEC PER NETWORK SWITCH

NETWORK SWITCH 1

NETWORK SWITCH 2

NDB'S 1-8:
10.0.1.101…10.0.1.108

NDB'S 9-16:
10.0.1.109…10.0.1.116

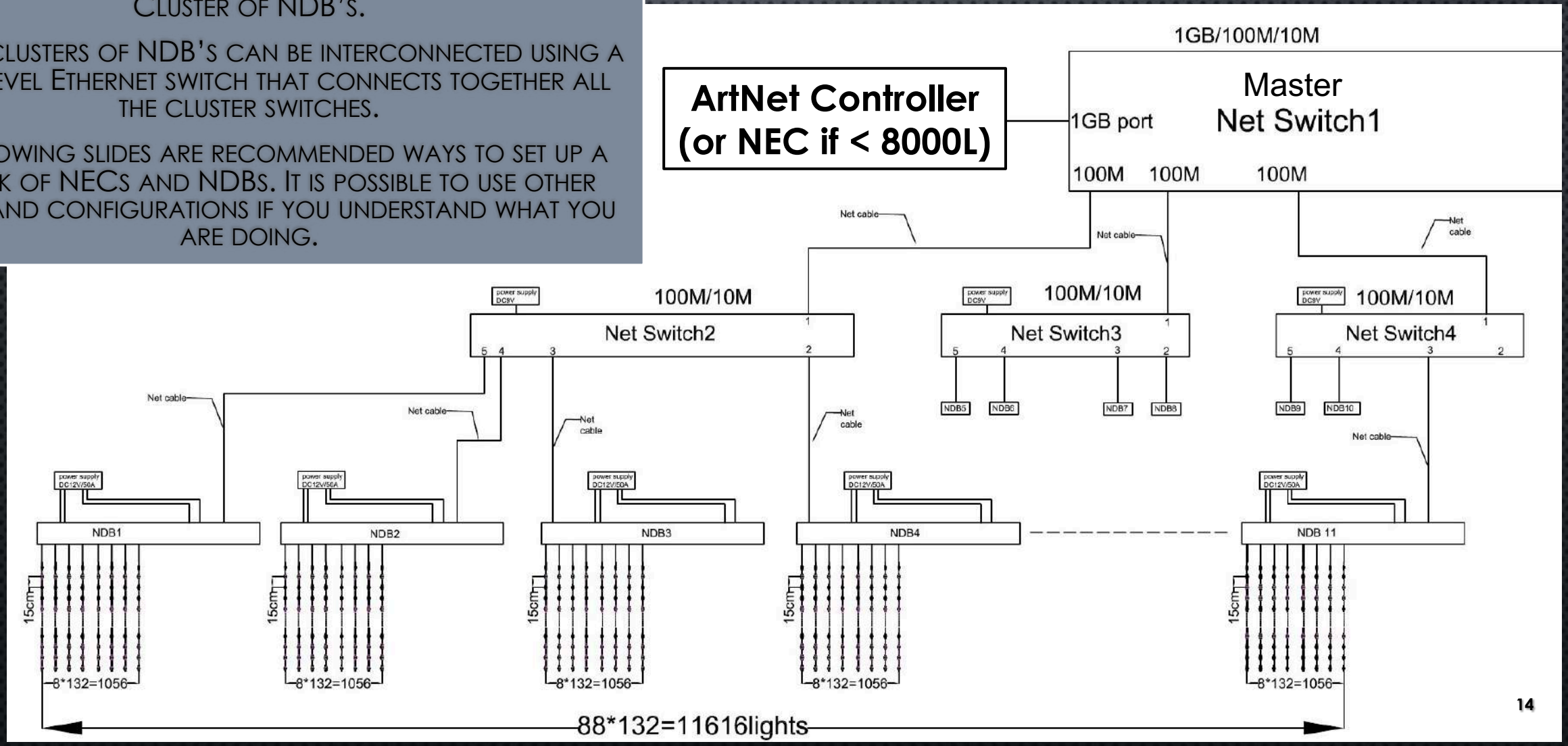
Note: Even though the NEC sends individual data commands for 8000 lights, using multiple NECs can increase refresh rate performance, especially if using the built-in .WAV audio player.

NEC: NETWORK CONFIGURATION GUIDE
MULTIPLE NETWORK SWITCHES (CONT.)

THIS GRAPHIC SHOWS A SECOND METHOD TO CONNECT A SINGLE CLUSTER OF NDB'S.

MULTIPLE CLUSTERS OF NDB'S CAN BE INTERCONNECTED USING A HIGHER-LEVEL ETHERNET SWITCH THAT CONNECTS TOGETHER ALL THE CLUSTER SWITCHES.

THE FOLLOWING SLIDES ARE RECOMMENDED WAYS TO SET UP A NETWORK OF NECS AND NDBS. IT IS POSSIBLE TO USE OTHER SETTINGS AND CONFIGURATIONS IF YOU UNDERSTAND WHAT YOU ARE DOING.



NEC: NETWORK CONFIGURATION GUIDE
LINKING MULTIPLE NEC'S

Master-Slave DDP Network

Master NEC
10.0.1.21
(Effects Player, File Player or Light Show Mode)

NEC #2 (Slave #1)
10.0.2.21
Network Port -> Network Switch

NEC #3 (Slave #2)
10.0.3.21
Network Port -> Network Switch

NEC #4 (Slave #3)
10.0.4.21
Network Port -> Network Switch

NEC Network Port -> Master Network Switch

Network Switch -> NDB's
10.0.1.101…116

Network Switch -> NDB's
10.0.2.101…116

Network Switch -> NDB's
10.0.3.101…116

Network Switch -> NDB's
10.0.4.101…116

Pro Tip: A *tiered* layout, as pictured here, has proven to be a more efficient network design than simply daisy-chaining one switch to the next, inline.

LINKING MULTIPLE NEC'S
MASTER NEC→SLAVE CONFIGURATIONS

When connecting multiple NEC's in a light design, we need to manually set each NEC Cluster's *Input & Output Assignments*, via ***Network Setup***. This is not accomplished in *Auto-Configuration* process (or NDB interface).

The Master NEC will not configure Slave NEC's.

Network Setup
Push to Config

Output To
Network/DDP

Input From
Net: DDP

Assigning Inputs & Outputs

1. From the **Master NEC** go to the Mode you plan to use & select "***Network Setup/Push to Config***" (see graphics). Scroll until you see the following:
   - Set "***Output To…***" to "**Network/DDP**"
2. For each **Slave NEC** go to *Slave Mode* from the NEC **Main Menu**, then select "***Network Setup/Push to Config***".
   - Scroll to "***Output To…***" and select "**Network/DDP**"
   - Scroll to "***Input From…***" and select "**Net: DDP**"

Note: When Master NEC Input is running DDP (built-in effects), effect alterations (speed, pallet, trails, etc.) must be configured manually in **Operating Mode / *Effects Player*** of each Slave NEC if you desire to match with other NEC's on the network. Master NEC will not dictate effect alterations to Slave NEC's.*

*If using DMX input such as Minleon's Show Controller, (see next slide) this step is unnecessary.

LINKING MULTIPLE NEC'S
DMX TRIGGER→SLAVE NEC NETWORK SET UP

DMX -> NEC1 DMX in (set to Slave Mode)

NEC1 – 10.0.1.21
Network Port -> Network Switch

NEC1 DMX Out -> NEC2 (Slave #2) DMX-In

NEC2 – 10.0.2.21
Network Port -> Network Switch

NEC2 DMX Out -> NEC3 (Slave #3) DMX-In

NEC3 – 10.0.3.21
Network Port -> Network Switch

Refer to this Set Up when using an ArtNet/ DMX console or the ***Show Controller***

Network Switch -> NDB's 10.0.1.101…102…

Network Switch -> NDB's 10.0.2.101…102…

Network Switch -> NDB's 10.0.3.101…102…

LINKING MULTIPLE NEC'S
DMX TRIGGERING (NEC-UI)— NEC SLAVE MODE CONFIGS

When connecting multiple NEC's in a light design, we need to manually set each NEC Cluster's Input & Output Assignments, via *Network Setup*. This is not accomplished in *Auto-Configuration* process (or NDB interface).

Internal Assignment of Inputs & Outputs

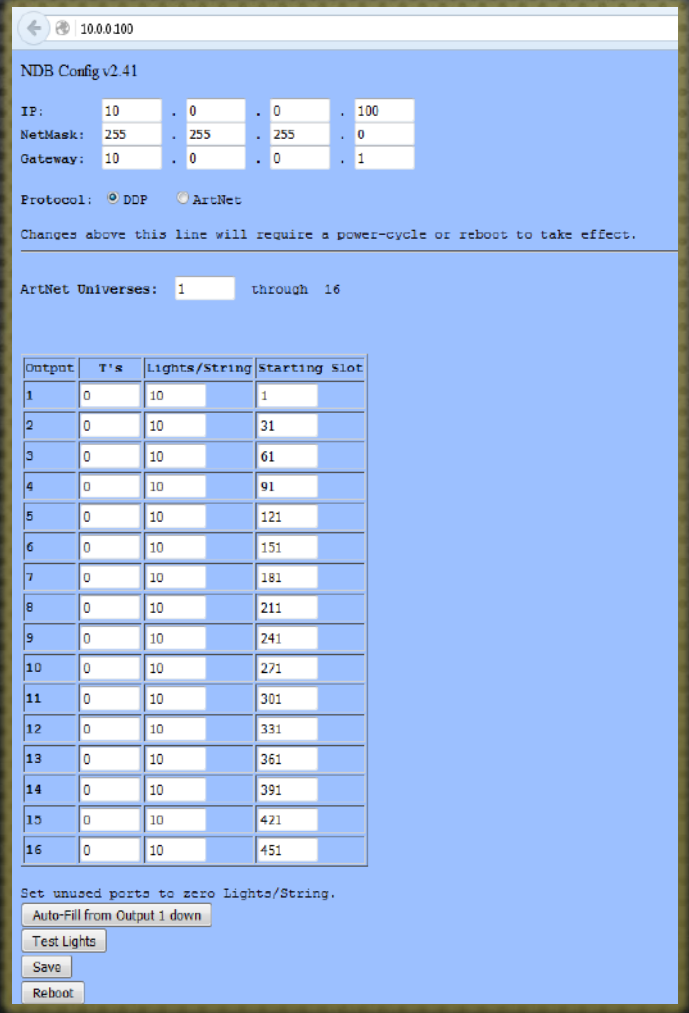
1. All NEC's set to *Slave Mode* from the NEC **Main Menu**, then select "***Network Setup/Push to Config***". (see graphics below)
2. Scroll to "***Output To…***" and select "**Network/DDP**"
3. Scroll to "***Input From…***" and select "**DMX Port**"
4. NEC's are wired together via *DMX In/Out* ports. DMX data input into first controller & sent out to *DMX In port* on the second NEC…and so on to NEC3, as pictured on previous slide.

Network Setup
Push to Config

Output To
Network/DDP

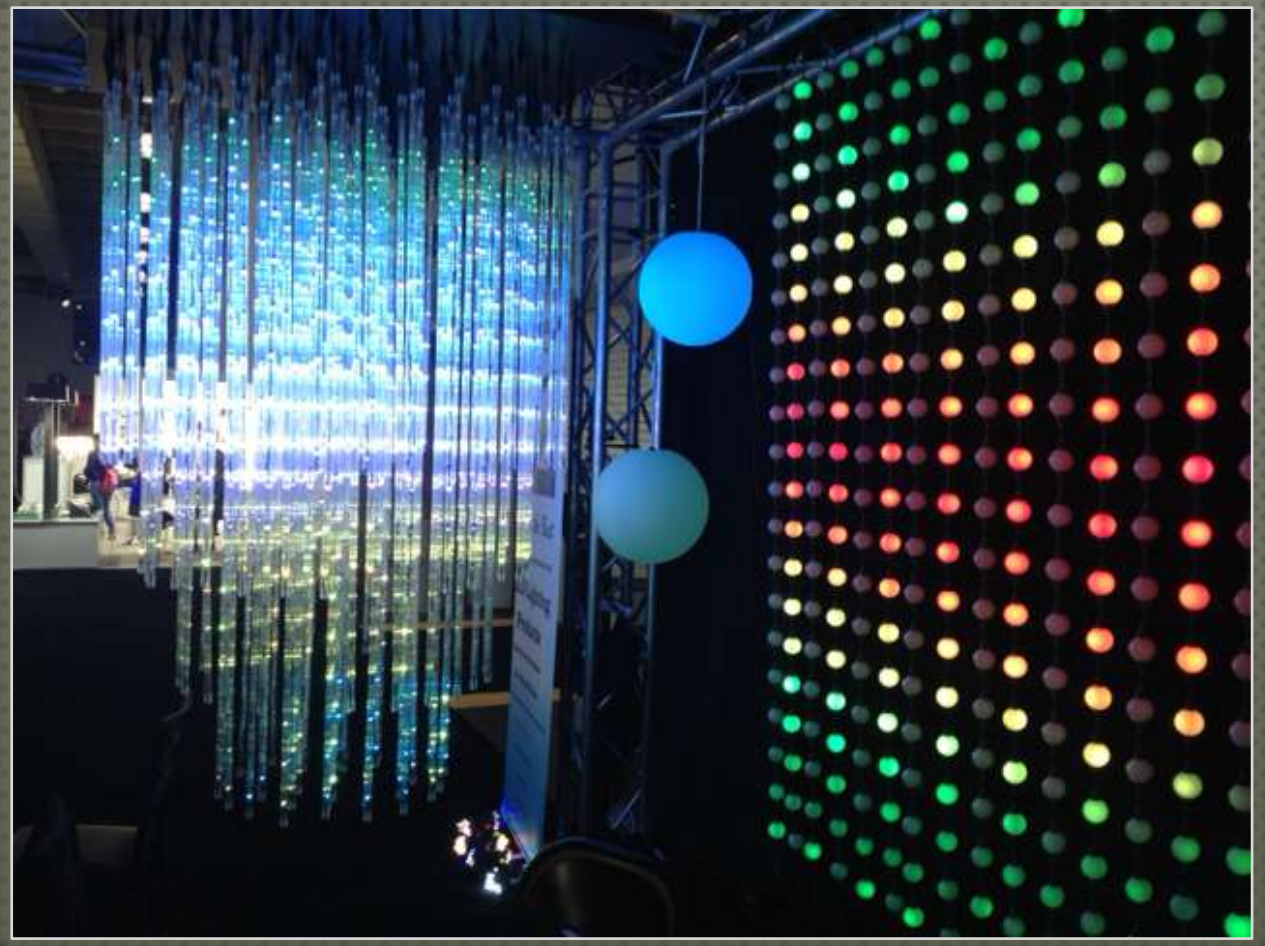
Input From
DMX Port

NEC: NETWORK CONFIGURATION GUIDE
TROUBLESHOOTING & BEST PRACTICES



1. The NEC-NDB System works best when Uni-casting the data, rather than Broadcasting.
2. When employing multiple NDB's, capture a screen shot of the Network Configuration Page (*at left, refer to Slide* 9). Print this out and keep in the weatherproof box with the NDB. In the event that one NDB needs a hard re-set to factory defaults or replaced, we can then manually configure this NDB, rather than re-AutoConfiguring the entire network.
3. Use the "**Test Lights**" feature of each NDB before installing in tough-to-access places to ensure functionality. This can be done with a single string attached to a single, configured NDB output. (See button at bottom left of the graphic.)
4. Label all NDB's, spacer cables & Network/Ethernet Cables on both ends. If a cable needs replaced, this will make it easier to identify.
5. Do not cable tie Data or Network Cables with Main Voltage/Power cables. This could distort the Data Signal.
6. Power all NEC's from the same power strip, isolated from NDB's on the network. This way we can re-cycle the power to the NDB's without cutting power to the NEC's.
7. Assign each Cluster of NDB's to it's own power breaker.
8. To prevent a 20Amp breaker from tripping, limit 5 NDB's (approx. 900 RGB's each) per breaker. This keeps each breaker running at about 75%, with 25% headroom for potential power spikes.

NEC: NETWORK CONFIGURATION GUIDE
QUESTIONS & RESOURCES



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& REFERENCE THIS PRESENTATION.

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WE ENCOURAGE YOU TO VIEW THESE RELATED TUTORIALS:

- **NEC – EFFECTS PLAYER & LIGHT SHOW MODES**
- **NDB+ USER GUIDE**
- **DMX TRIGGERING THE NEC**
- **POWER & DATA MANAGEMENT**

*****

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RGB PLUS

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