

Establishing a TESLA Cooperative Group

This application note describes the core procedure and settings required to establish a cooperative group of two TESLA 3000 recorders on a network. Its application can be extended to a cooperative group of up to four recorders. Detailed information on the configuration and operation of a cooperative group is provided in the TESLA 3000 and 4000 manuals, and the reader is advised to refer to those sources for details.

This application note purposefully avoids duplication of the information found in the manuals. All instructions regarding basic settings, and the retrieval, manipulation, and interpretation of record files, are available in the manuals.

TESLA Unit Standard Configuration Parameters

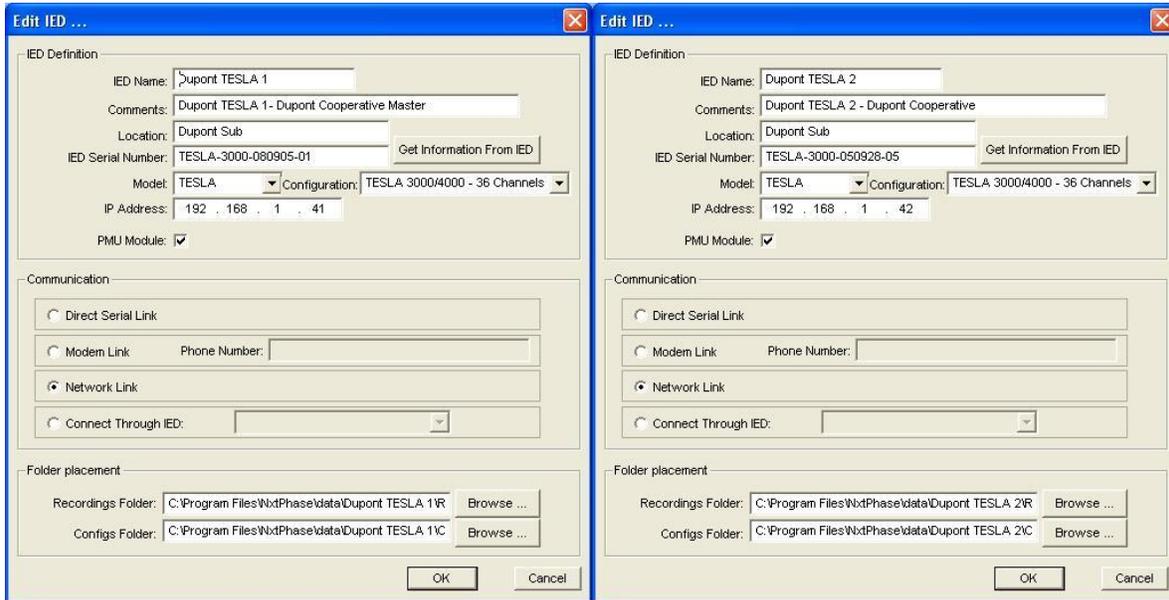
Configure each cooperative TESLA unit as a stand-alone independent device, including channels and triggers.

Cooperative mode operation requires key settings to be consistent on all recorders in a cooperative group. The following is a list of the critical settings that need to be identical for all cooperative units:

1. Time Control Settings (Utilities> Time Setup Screen)
 - Incoming IRIG Time Signal Properties
 - Recorder Time Zone
2. Recording Control Settings (Utilities>Recording)
 - Trigger Mode
 - Pre-Trigger Mode
 - Normal Record Mode
 - Maximum Record Length
3. TESLA Device Configuration (ID screen in Configuration editor)
 - Sample Rate

It is wise to include the cooperative group or substation name in each defined TESLA name so as to make tracking and future associations easier. Include additional useful information in the comments field.

For this example, two TESLA 3000 units were created and defined for use in the Dupont Substation. The ID screen definitions for the two units are shown in Figure 1.



Dupont Substation TESLA units, Figure 1

TESLA Master Unit Configuration Parameters

One unit in a cooperative group needs to be designated as the Master Unit. The Master Unit is the primary interface between the cooperative group's units and TESLA Control Panel. In addition to its normal recording role, the Master Unit:

1. Maintains the list of group recordings
2. Provides the information needed by TESLA Control Panel to combine records
3. Provides IP address information about the other group units
4. Acts as the communication gateway for remote access when a modem is used

The settings for the defined Master Unit differ slightly from the standard group units as follows:

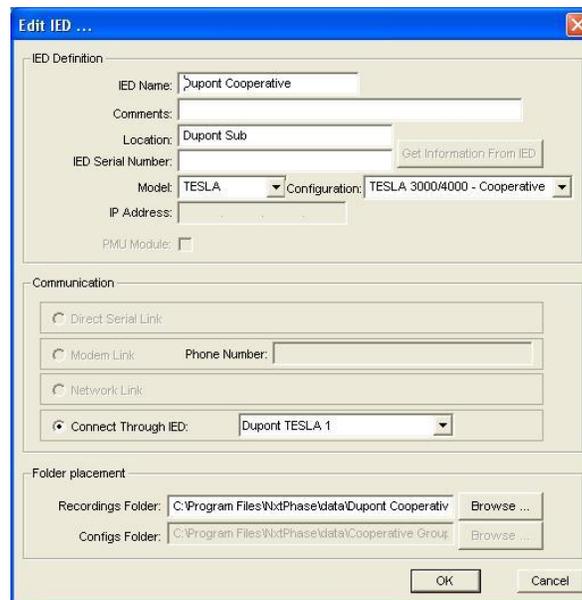
1. The IED comment should indicate that the unit is a Master Unit. See Dupont TESLA 1 in Figure 1.
2. The Communication selection must agree with the type of communications that will be used for remote access to the Master Unit.

TESLA Pseudo Cooperative Group IED Configuration Parameters

Within Control Panel, a special Cooperative Group IED is created to work with the cooperative recording group's units. When the Cooperative Group IED is selected, Control Panel functions are applied to the group of recorders rather than to an individual one.

From the TESLA Control Panel Main Menu, select new in the same manner as for a new TESLA definition. Open the drop-down Configuration menu and choose TESLA 3000/4000 – Cooperative. Define names and comments that clearly associate the pseudo device with the cooperative group and its location. Leave the IP Address field blank.

Open the Communication Connect Through IED drop down box and select the previously defined Master Unit, then select OK. See the example for the Dupont Cooperative IED in Figure 3.



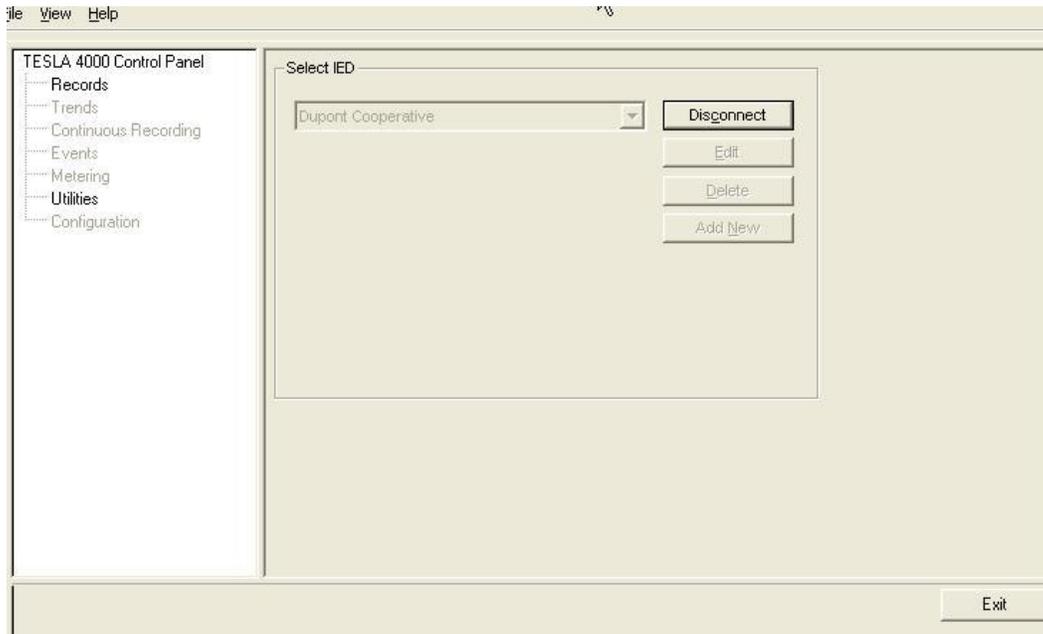
The screenshot shows the 'Edit IED ...' dialog box with the following fields and options:

- IED Definition:**
 - IED Name: Dupont Cooperative
 - Comments: (empty)
 - Location: Dupont Sub
 - IED Serial Number: (empty) with a 'Get Information From IED' button
 - Model: TESLA (dropdown)
 - Configuration: TESLA 3000/4000 - Cooperative (dropdown)
 - IP Address: (empty)
 - PMU Module:
- Communication:**
 - Direct Serial Link:
 - Modem Link: Phone Number: (empty)
 - Network Link:
 - Connect Through IED: Dupont TESLA 1 (dropdown)
- Folder placement:**
 - Recordings Folder: C:\Program Files\NxtPhase\data\Dupont Cooperative (with 'Browse ...' button)
 - Configs Folder: C:\Program Files\NxtPhase\data\Cooperative Group (with 'Browse ...' button)

Buttons: OK, Cancel

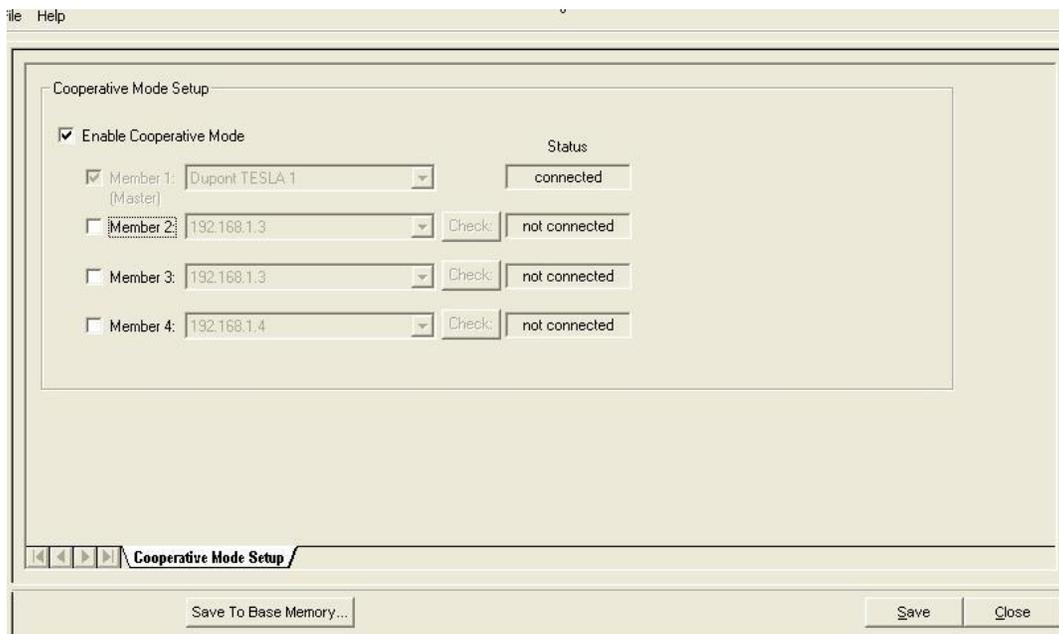
Cooperative Group IED ID Window, Figure 3

Once the Cooperative Group IED is created, all of the cooperative group units need to be added to the defined cooperative group. This is done on the Cooperative Mode Setup screen, and requires that all group units be powered on and connected to the network. To access the Cooperative Mode Setup screen while in TESLA Control Panel, select the Cooperative Group IED from the IED list on the Main Menu tab and click on Connect. Once connected, the online window and menu will appear. Note that unlike a standard connection with a TESLA unit, Records and Utilities are the only options that appear. See Figure 4.



Cooperative Group IED Online Menu, Figure 4

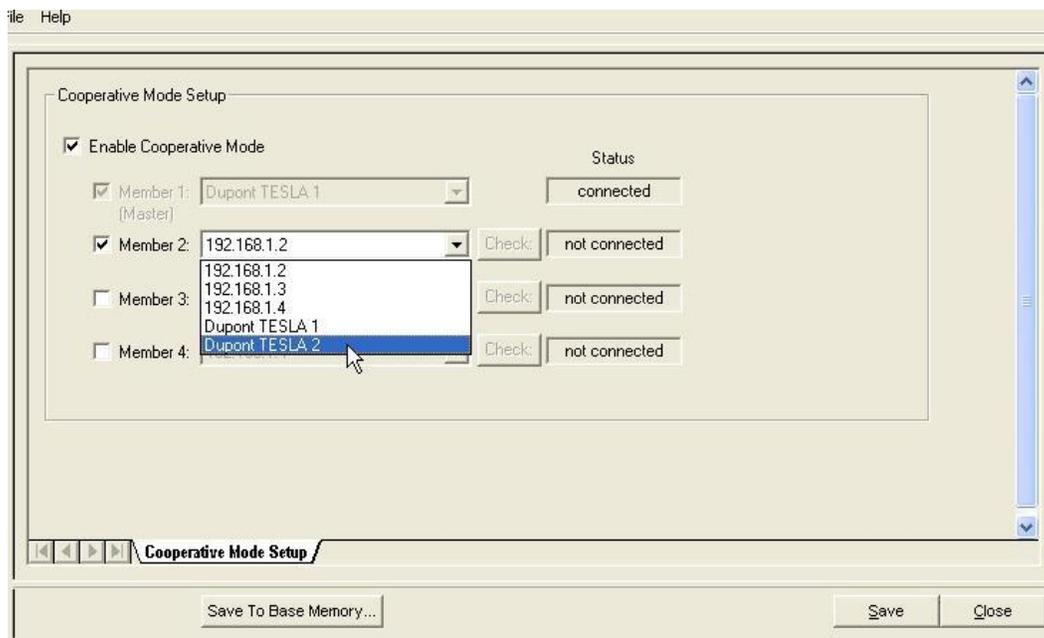
Select the Utilities screen by double-clicking on Utilities in the Main Menu tree. The Utilities – Cooperative Mode Setup screen will then appear. The defined Master Unit will be shown as Member 1 (Master) by default. See Figure 5.



Cooperative Group IED Cooperative Mode Setup Menu, Figure 5

Check the Enable Cooperative Mode box, each required member box. Only Member 2 is required for this example. For each member, use the drop down box to select and associate a previously defined group member unit. See Figure 6. If an expected unit does not appear in the Member list, check the unit's IED Definition for errors.

Note that this member list determines the order in which records are combined. The member number shown will be pre-pended onto each digital and analog channel in the combined record so as to identify which unit it came from.

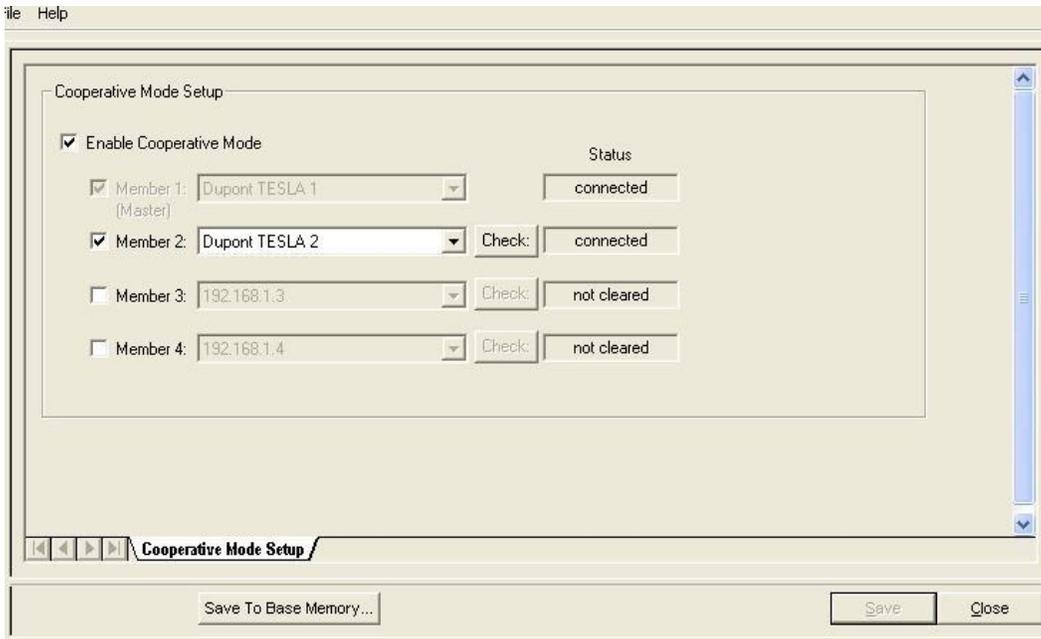


Cooperative Group IED Cooperative Mode Setup Menu, Figure 6

Once the member units are defined, click Save and TSLA Control Panel will attempt to connect to each unit to provide member IP addresses and to enable cross-triggering. Progress status information will be displayed as each member unit is connected and updated (i.e. updating, clearing, connected). If this process fails, check the unit's IED Definition for errors, and check for a proper network connection to all units. Note that a quick communication integrity test can be performed prior to attempting the cooperative mode setup by simply connecting to each unit from Control Panel.

Once the cooperative mode set up is complete and the status of all cooperative mode units is shown as connected, click Save and Close. See Figure 7. The cooperative record group configuration is now complete and cross-triggering, record collection and combining of member records are now enabled.

Refer to the manuals for instructions regarding the retrieval, manipulation, and interpretation of record files.



Completed Cooperative Group IED Cooperative Mode Setup, Figure 7