DNP Points List

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Point Count

DEM Main Control System DNP Interface—The DNP master station should define the Main Control System with the following status, analog input, analog output, and control points:

Point	Count
Status	11
Analog Input	34
Analog Output	3
Control	5

CES Passthrough DNP Interface—The DNP master station should define every CES Unit with the following status, analog input, analog output, and control points:

Point	Count
Status	32
Analog Input	17
Analog Output	0
Control	4

Tap Control DNP Interface—The DNP master station should define every Tap Control with the following status, analog input, analog output, and control points:

Point	Count
Status	11
Analog Input	18
Analog Output	2
Control	1

Introduction

The DNP point list in this document defines the interface between the DEM and the customer's SCADA system, Distribution Management System (DMS) or other advanced energy management applications. This interface is referred to in this document as the SCADA Master Interface, although it can be used for a variety of purposes. It is constructed by the DEM software from a combination of DNP points exchanged over the DEM's communication interface to the Fleet of CES Units, and from information internal to the DEM. An example of information exchanged directly with each CES Unit is the Unit's inverter Enable/Disable status. This status point is passed directly without alteration to an External SCADA Master Station through the virtual device interface. An example of information constructed by the DEM is the DEM's Auto/Manual Operation state. This digital input represents whether or not the Unit, if not locally overridden at the Unit's control panel, is being controlled by the DEM's automatic operation logic, or if that logic is being overridden at the Unit level by a Manual Override on the Unit dashboard.

Internally, the DEM populates the points in the DNP Data Acquisition Server (DAS) using an API and XML-based interchange, while the SCADA Master interacts with the points using DNP. The internal details are covered in the DEM Users Guide and DEM System Administrators Manual. The virtual device interface can be exposed in various formats as discussed in these other documents. The present document defines the superset of all points available in the DEM.

There are three classes of points provided. One class of points (CES DEM DNP Interface, or just DEM Interface) provides a status and control interface to energy dispatch operation in the DEM, and a second class of points (CES DEM Passthrough DNP Interface, or just Passthrough Interface) provides a pass-through interface between the actual CES Units and the SCADA Master. The former class allows the SCADA Master to interact with the DEM's Dispatch Engine directly. This interface is for the macro-scale interaction with the DEM. For example, a regional need to limit demand to a predetermined number of megawatts could be sent to the DEM via this interface.

The second class of points provides real-time analog and digital status information from each CES Unit without imposing any additional communication burden on the distribution wide area network. The information comes from the most-recent DNP poll of the CES Units (cached results). Control commands from the SCADA system are passed through, as received, without modification, to the CES Units.

Points in the first class above are defined in a virtual DNP device with a unique DNP address associated with the DEM Dispatch Engine. Points in the second class of virtual devices are defined in relation to a unique DNP address for each CES Unit. Therefore both the DEM and each CES Unit have two unique DNP addresses. One address is used by the DEM in accessing the Unit over the wide area network. The second address is for the DNP Application Server's Virtual DNP Device address, accessed from the SCADA Master. In systems where the SCADA Master is well-suited to accessing all of the DEM's virtual points from a single DNP virtual device, an alternative mapping of virtual points is provided. This is called the Unified Virtual Device Interface or "Megamap." The points in this interface can be extensively remapped, reordered and generally reorganized under control of the system administrator. Please refer to the above-mentioned documents for configuration details.

The third class of points provides access to some number of Tap Control virtual devices, which may optionally be present in some systems which include ungrounded single phase Taps (SWER lines). Similar to the CES Unit virtual interface, the number of Tap Controls modeled is system-specific and limited to systems supporting SWER lines. As with CES units, each Tap Control must be defined with a unique combination of IP address and port (if IP-addressable), and DNP address.

The DEM's Master Station interface is designed to be compliant with the DNP Standard as a DNP 3 Class 2 (slave) device. The DEM does not presently support unsolicited report by exception. The DEM does support the DNP internal indications

and data quality flags. Please note that the DNP control outputs explicitly require either latched or pulsed operation. As with any DNP-compliant device, care should be taken to ensure that the command sent matches the type (pulsed or latched) specified in the interface.

The Main Control System Interface section defines the interface at the main control system level. There is one, and only one, of these devices represented in the interface. The CES Passthrough Interface section defines the interface at the CES Unit level. This interface is identical for all CES Units and one copy exists for each CES Unit.

Main Control System Interface

DEM Status Points

Point #	Name—Definition
0	**DEM Real Power Dispatch Enabled**—Set if the DEM is enabled to dispatch Real Power Charge/Discharge requests to CES Units, Off if dispatch is being sequenced off, or is presently off.
1	**DEM Reactive Power Dispatch Enabled**—Set if the DEM is enabled to dispatch Reactive Power Charge/Discharge requests to CES Units, Off if dispatch is being sequenced off, or is presently off.
2	**DEM Dispatch is Sequencing Down**—The DEM has been requested to stop controlling units but allow the units to time out on remote control which will in turn disable remote operation in progress. This will allow the DEM to restart without significantly changing the energy charge/discharge state of the system. When all communicating units have confirmed that their remote operation is disabled, the status will change to false.
3	**CES Unit Information Alarm**—Rollup of CES Unit Information Alarms, meaning that one or more Units have an Information Alarm active. Information Alarms bring to the user's attention a condition that should be of interest, but may not affect the actual operation of the Unit.
4	**CES Unit Warning Alarm**—Rollup of CES Unit Warning Alarms, meaning that one or more Units have a Warning Alarm active. Warning Alarms indicate an abnormal condition, but the Unit is still in service.
5	**CES Unit Inhibit Alarms**—Rollup of CES Unit Inhibit Alarms, meaning that one or more Units have an Inhibit Alarm active. Inhibit Alarms indicate that the converter is not able to provide real or reactive power control, and is shut down.
6	**CES Unit Isolate Alarms**—Rollup of CES Unit Isolate Alarms, meaning that the Unit's DC contactors have opened to isolate the battery from the system. Reactive power control is still operational.
7	**CES Unit Tripped Alarms**—Rollup of CES Unit Tripped Offline Alarms, which means that the Unit has been disconnected from AC, and the DC contactors are open—customers are out.
8	**PV Dispatch Enabled**—Set if the system is enabled for Photovoltaic (PV) Integration.
9	**Tap Control Enabled**—Set if the system is enabled for Single Phase Tap Control.
10	**Evaluation Interval is delayed**—Set if the Evaluation interval is being lengthened by the Adaptive Evaluation Interval feature (on any tap).
11-23	Reserved.

Main Control System Interface

DEM Analog Input Points

Point #	Name—Definition
0	**System Real Power Request Setting**—Regional System Real Power Request as set by the DEM Operator, or from an external system. MW (-) for Charge, or ()+) for Discharge. Requests an aggregated Fleet response managed by the DEM. Active if Real Power Dispatch is Enabled. It suspends scheduled energy dispatch, including Photovoltaic Integration. Each unit is MW x 1000. Data Type: UINT32.
1	**Total CES Fleet Demand**—Total aggregated output in MW for the CES Fleet. This number will be negative if the fleet is discharging. This value excludes Units that are unavailable. It includes Units that are islanded, or dispatchable. Each unit is MW x 1000. Data Type: UINT32.
2	**Fleet Demand Capacity**—Total maximum aggregated output in MW available from the CES Fleet. This value excludes Units that are unavailable. It includes Units that are islanded or dispatchable. Each unit is MW x 1000. Data Type: UINT32.
3	**Fleet Demand Percent**—Fleet discharge demand proportion of available maximum output from Analog Input Points 1 and 2. Each unit is Percent x 100. Data Type: INT32.
4	**Fleet Available Energy**—The amount of stored energy in the fleet now available for dispatchable discharge. This excludes Units that are islanded or unavailable. Each unit is MWH x 1000. Data Type: UINT32.
5	**Fleet Energy Capacity**—The total stored energy rating for all Units. This value excludes Units that are unavailable. It includes Units that are islanded or dispatchable. Each unit is MWH x 1000. Data Type: UINT32.
6	**Islanding Reserve Scale Factor**—Scale factor for island energy capacity expressed in units of PU x 1000 (PU is Per Unit); applies to all units in the Fleet. 1.0 means normal islanding reserves are maintained. Fleet island reserves maybe reduced or increased by a factor ranging from 0 to 32.76. Each unit is PU x 1000. Data Type: UINT32.
7	**Fleet Demand Phase A**—Same as Point 1 for Phase A. Each unit is MW x 1000. Data Type: INT32.
8	**Fleet Demand Phase B**—Same as Point 1 for Phase B. Each unit is MW x 1000. Data Type: INT32.
9	**Fleet Demand Phase C**—Same as Point 1 for Phase C. Each unit is MW x 1000. Data Type: INT32.
10	**Fleet Demand Capacity Phase A**—Same as Point 2 for Phase A. Each unit is MW x 1000. Data Type: UINT32.
11	**Fleet Demand Capacity Phase B**—Same as Point 2 for Phase B. Each unit is MW x 1000. Data Type: UINT32.
12	**Fleet Demand Capacity Phase C**—Same as Point 2 for Phase C. Each unit is MW x 1000. Data Type: UINT32.
13	**Fleet Demand Percent Phase A**—Same as Point 3 for Phase A. Each unit is Percent x 100. Data Type: INT32.
14	**Fleet Demand Percent Phase B**—Same as Point 3 for Phase B. Each unit is Percent x 100. Data Type: INT32.
15	**Fleet Demand Percent Phase C**—Same as Point 3 for Phase C. Each unit is Percent x 100. Data Type: INT32.
16	**Station MVAR Request**—This is the amount of MVARs of RPC that the Fleet should provide to the grid. This will normally match the analog output value sent to the DEM from the external EMS or SCADA Operator. Actual Station per-phase reactive power is available from the station transformer breaker. Each unit is MVAR x 1000. Support for multiple Fleets per station may be available in the future. Data Type: UINT32. ★
17	**Fleet MVAR**—Total aggregated output being provided in MVAR for CES Fleet. This value excludes Units that are unavailable. It includes Units that are islanded or dispatchable. Each unit is MVAR x 1000. Data Type: INT32.●
18	**Fleet MVAR Limit**—Total maximum aggregated output in MVAR available from CES Fleet. This is both a positive and negative limit. This number is calculated from the theoretical maximum output, based on the present real power output of each converter. This value excludes Units that are unavailable. It includes Units that are islanded or dispatchable. Each unit is MVAR x 1000. Data Type: UINT32.●
19	**Fleet MVAR Output Percent**—Fleet MVAR output as a proportion of maximum rate from Analog Input Points 17 and 18. Each unit is Percent x 100. Data Type: INT32.
20	**Fleet MVAR Output Phase A**—Same as Point 17 for Phase A. Each unit is MW x 1000. Data Type: INT32.
21	**Fleet MVAR Output Phase B**—Same as Point 17 for Phase B. Each unit is MW x 1000. Data Type: INT32.

DEM Analog Input Points—Continued

Point #	Name—Definition
22	**Fleet MVAR Output Phase C**—Same as Point 17 for Phase C. Each unit is MW x 1000. Data Type: INT32.
23	**Fleet MVAR Limit Phase A**—Same as Point 18 for Phase A. Each unit is MW x 1000. Data Type: INT32.
24	**Fleet MVAR Limit Phase B**—Same as Point 18 for Phase B. Each unit is MW x 1000. Data Type: INT32.
25	**Fleet MVAR Limit Phase C**—Same as Point 18 for Phase C. Each unit is MW x 1000. Data Type: INT32.
26	**Fleet MVAR Output Percent Phase A**—Same as Point 19 for Phase A. Each unit is Percent x 100. Data Type: INT32
27	**Fleet MVAR Output Percent Phase B**—Same as Point 19 for Phase B. Each unit is Percent x 100. Data Type: INT32
28	**Fleet MVAR Output Percent Phase C**—Same as Point 19 for Phase C. Each unit is Percent x 100. Data Type: INT32
29	**Units Unavailable**—Count of Units not available for automatic or manual remote discharge commands. Data Type: INT32.●
30	**Units Islanded**—Count of Units in islanded state. Data Type: INT32.●
31	**Units Dispatchable**—Count of Units that can be dispatched remotely. Data Type: INT32.●
32	**Total CES Fleet Apparent Power**—Total aggregated output in MVA for CES Fleet. This number will be negative if the fleet is discharging. This value excludes units that are unavailable. It includes units that are islanded or dispatchable. Each unit is MWA x 1000. Data Type: INT32.
33	**Fleet Apparent Power percent**—Fleet discharge apparent power proportion of available maximum output. Each unit is Percent x 100. Data Type: INT32.
34-39	Reserved.

★ Reactive Power Data—Identical to real power data with the exception that energy storage values are not present. Signed numbers are positive if reactive power is being generated at the sensed point.

● A configured Unit is Phase assigned, Group assigned, and has a valid configuration. All configured Units will fall into one of three categories using these definitions:

Dispatchable—
* Configured AND (at last CES Unit poll response)
* NOT Local (CES Unit Status Point 1; Local Mode FALSE) AND
* NOT Disconnected (CES Unit Status Point 70; System Disconnect FALSE) AND
* Enabled (Status Point 0; Enabled TRUE) AND
* NOT Inhibited (Status Point 18; Inhibit Alarm FALSE) AND
* NOT Isolated DC (Status Point 19; Isolate Alarm FALSE) AND
* NOT Tripped (Status Point 20; Trip Offline Alarm FALSE) AND
* NOT Islanded (Status Point 2; Running in Islanded Mode FALSE) AND
* Communication status is "OK"

Islanded—
* Configured AND
* Islanded (Status Point 2, Running in Islanded Mode TRUE) AND
* Communication status is "OK"

Unavailable—
* Configured AND, Not Dispatchable AND, Not Islanded
* OR Communication Status Not "OK"

Unavailable + Islanded + Dispatchable =

100% of configured Units at all times. These three subsets are mutually exclusive. Units not communicating are "Unavailable." Units that are in the DEM's Manual Control mode (controlled on the Unit control panel) are considered dispatchable.

Main Control System Interface

DEM Analog Output Points

Point #	Name—Definition
0	**External System Real Power Request—**Desired System Real Power Request in MW; (-) for Charge, or (+) for Discharge. Request an aggregated Fleet response managed by the DEM. Each unit is MW x 1000. Data Type: UINT16.
1	**External Three-Phase Reactive Power Compensation—**Requested total RPC output from fleet. Each unit is MVAR x 1000. Data Type: UINT16.
2	**Reserve Power Proportional Reduction—**Percentage reduction factor for island energy capacity. 100% means normal islanding reserves are maintained. Each unit is Percent x 1000. Data Type: UINT16.
3-5	Reserved. Data Type: UINT16.

DEM Control Points

Point #	Name—Definition
0	**Enable Real Power—**Pulse-On to enable remote automatic control of Real Power Charge/Discharge. Analog outputs should have already been set to the Real Power Charge/Discharge requirements. Pulse-Off to disable remote automatic control of Real Power. If disabled, the DEM will send analog outputs to all Units with values of zero for Real Power, and if Reactive Power Control (see Control Point 1) is not enabled, Reactive Power analog outputs will also be set to zero.
1	**Enable Reactive Power—**Pulse-On to enable remote automatic control of Reactive Power, exclusive of Real Power Charge/Discharge. This mode allows the DEM to control Reactive Power at all times, even when Real Power Charge/Discharge is not active. Pulse-Off to disable remote control of Reactive Power. If disabled, the DEM will send analog outputs to all Units for Reactive Power of zero.
2	Reserved.
3	**Alarm Reset—**Pulse-On to reset the Manual Reset alarms in the DEM.
4	**Enable Photovoltaic System Integration—**Pulse-On to enable Photovoltaic (PV) Integration at the system level. Pulse-Off to disable.
5	**Enable Single Phase Tap Control Logic—**Pulse-On to enable the Single Phase Tap Control logic at the system level. Pulse-Off to disable.
6-7	Reserved.

The points below are defined in the CES DEM to represent the state of each CES Unit as seen by external applications such as Distribution SCADA. The list below is repeated for each CES Unit, and each unit has a unique DNP address when accessed from the SCADA master station. Most of the points in the lists are passed directly from the CES Units to the DEM's SCADA interface. The ones that are processed or constructed in the DEM are noted in the Comments field.

CES Status Points

Point #	Name—Definition
0	Reserved.
1	**Enabled**—Set if the Unit is presently enabled to control power. This point is the reported status of the CES Unit.
2	**Local Mode**—Set if the Unit is presently switched to Local Control mode (versus Remote/SCADA Control mode). The switch on the front panel could be in the Local-Enabled position, or the Local-Disconnect position. See Point 22 to determine which of these conditions is true.
3	**Running in Islanded Mode**—Set when the Unit has moved to Islanded mode because of a loss of synchronism, a voltage disturbance, or a manual request.
4	Reserved.
5	Reserved.
6	**Information Alarm**—Set if there are any Information Alarms active in the Unit.
7	**Warning Alarm**—Set if there are any Warning Alarms active in the Unit.
8	**Inhibit Alarm**—Set if there are any Inhibit Alarms active in the Unit.
9	**Isolate Alarm**—Set if there are any Isolate Alarms active in the Unit.
10	**Trip Offline Alarm**—Set if there are any Trip Offline Alarms active in the Unit.
11	**Discharging**—Set if the Unit is discharging real power.
12	**Charging**—Set if the Unit is charging.
13	**Manual Control Mode active**—Set if the DEM's automatic control strategy has been overridden in the DEM by an explicit Real or Reactive Power Charge or Discharge command.
14	**Islanding Inhibited**—Set if Unit status indicates that it has been requested to not disconnect from the ac source if ac is lost. If ac is lost, the load will be dropped.
15	**Islanding Requested**—Set if Unit status indicates that Islanded operation has been requested—Ac will be disconnected and the load will be powered from the converter, if possible.
16	**Communication Failure**—Set if Unit has not responded to a request of any kind, and a configurable number of retries have failed. Cleared on a successful communication request.
17	**Ac Breaker State**—Set if the breaker is closed.
18	**Dc Breaker State**—Set if the breaker is closed.
19	**Remote Power Control Disabled by SCADA**—Set if SCADA has commanded the Unit's power control (Enable Request) to be disabled, preventing remote operation. Local control can be accomplished by local control at the Unit, either through the Unit's firmware via local HMI, or with the selector switch.
20	**Islanding Inhibited by SCADA**—Set if CES Control Point 2 (Inhibit Islanding) is active.
21	**Islanding Requested by SCADA**—Set if CES Control Point 3 (Request Islanding) is active.
22	**System Disconnected**—Set if the Mode selector switch is in the Disconnect position. The intended state of the Unit is: ac breaker is open, dc breaker is open, and the converter is inhibited.
23	**Manual Reset Alarm Active**—Set if there are any alarms active that require a Manual (software-controlled) Reset.

CES Status Points—Continued

Point #	Name—Definition
24	**PVI Dispatch Enabled**—Set if the Unit's Group is enabled for Photovoltaic (PV) Integration, and the system is also enabled for PVI.
25	**Islanding Inhibited**—Set if the DEM, via the DCR, has commanded the Unit to Inhibit Islanding.
26	**Islanding Requested**—Set if the DEM, via the DCR, is commanding the Unit into a forced islanded state.
27	**Door is Open**—Set if the cabinet door is open or ajar.
28	**Remote Power Control Disabled by DCR**—Set if the DEM Control Room (HMI) has commanded the Unit's power control (Enable Request) to be disabled, preventing remote operation. Local control can be accomplished by local control at the Unit, either through the Unit's firmware via local HMI, or with the selector switch.
29	**Bypass Switch to CES Source Open (if used)**—Set if the optional Bypass switch to CES Unit source side isolation switch is open; in combination with the load side isolation switch being open, and the tie switch being closed—represents full bypass with CES Unit isolated.
30	**Bypass Switch to CES Load Open (if used)**—Set if the optional Bypass switch to CES Unit load side isolation switch is open.
31	**Bypass Switch Tie Closed (if used)**—Set if the optional Bypass switch tie switch is closed.
32	**Intelligent Load Management Enabled**—Set if the Intelligent Load Management is enabled. This feature provides configurable maximum and minimum demand limits which cause the unit to charge/discharge to maintain source terminal real power flow within the limits.
33	**Unit is Configured to Monitor Only**—Set if the unit is configured to be in monitor only mode; DEM feature, not reported from the unit.
34	**Tap Control Enabled**—Set if the unit is on a single-phase tap which is configured and is being controlled by the DEM's Tap Control algorithm and Local Voltage Regulation is enabled at the unit.
35-47	Reserved.

The Analog Input Points are defined in the CES DEM to represent the state of each CES Unit as seen by external applications such as Distribution SCADA. The list below is repeated for each CES Unit, and each Unit has a unique DNP address when accessed from the SCADA master station. Most of the points in the lists are passed directly from the CES Units to the DEM's SCADA interface. The ones that are processed or constructed in the DEM are noted in the Comments field.

CES Analog Input Points

Point #	Name—Definition
0	**Transformer Primary-Side Voltage Estimate**—Based on secondary side voltage +/– the drop/rise due to current through the impedance of the transformer, reported on a 120 Vac nominal scale basis. Each unit is PU x 1000. Data Type: INT16.
1	**Line Power**— + for Watts from grid to load/battery (charging/consuming), – for Watts from generation/battery to grid (discharging/producing). Each unit is kW x 100. Data Type: INT16.
2	**Line VARs**— + for VARs from grid to load/battery (charging/consuming), – for VARs from generation/battery to grid (discharging/producing). Each unit is 100 kVARs x 100. Data Type: INT16.
3	**Available Energy**—The amount of stored energy in kilo-watt-hours available for dispatchable discharge. This is exclusive of charge reserved for backup/islanding. Range is 0-2500 for 25 kWH battery, or 0-10,000 for a 100 kWH battery. Each unit is kWH x 100. Data Type: UINT16.
4	**Percent Available Energy**—The amount of stored energy as a percentage of the Unit rating available for dispatchable discharge. This is exclusive of charge reserved for backup/islanding. Each unit is Percent x 10. Data Type: UINT16.
5	**CES State of Charge**—As reported by BMS but then adjusted to full charge and full depletion as defined for the system, and may differ from true battery full charge, or zero charge. Each unit is Percent x 10. Data Type: UINT16
6	**PCS Power**— + for Watts to line/load from inverter (discharging/producing), – for Watts to inverter from line/load (charging/consuming). Each unit is kW x 100. Data Type: INT16.
7	**PCS VARs**— + for VARs to line/load from inverter, – for VARS from inverter to line/load. Each unit is kVARs x 100. Data Type: INT16.
8	**Load Power**— + for Watts from grid to load/battery (charging/consuming), – for Watts from generation/battery to grid (discharging/producing). Each unit is kW x 100. Data Type: INT16.
9	**Load VARs**— + for VARs to load, – for VARs from load. Each unit is kVARs x 100. Data Type: INT16.
10	**Line Apparent Power**—Power flow at source-side (grid connection point) of CES unit. Each unit is kVA x 100. Data Type: INT16. + for W from grid to load/battery (charging/consuming). – For W from generation/battery to grid (discharging/producing).
11	**Line Power Factor**—Power factor of the power flow above. Each unit is PU x 1000. Data Type: INT16. + for VARs from grid to CES unit. – for VARs from CES unit to grid.
12	**Load Apparent Power**—Power flow at source-side (grid connection point) of CES unit. Each unit is kVA x 100. Data Type: INT16. + for W from grid to load/battery (charging/consuming). – For W from generation/battery to grid (discharging/producing).
13	**Load Power Factor**—Power factor of the power flow above. Each unit is PU x 1000. Data Type: INT16. + for vars from grid to CES unit. – for vars from CES unit to grid.

CES Passthrough Interface

CES Analog Input Points

Point #	Name—Definition
14	**PCS Apparent Power**—Power flow at source-side (grid connection point) of CES unit. Each unit is kVA x 100. Data Type: INT16. + for W from grid to load/battery (charging/consuming). – For W from generation/battery to grid (discharging/producing).
15	**PCS Power Factor**—Power factor of the power flow above. Each unit is PU x 1000. Data Type: INT16. + for vars from grid to CES unit. – for vars from CES unit to grid.
16	**Battery Health**—State of Health reported by the battery if available. Each unit is Percent x 10. Data Type: INT16.

CES Analog Output Points

The DEM does not provide external control over CES Unit charge/discharge rates and settings—these are managed by the DEM Dispatch Engine.

CES Control Points

Point #	Name—Definition
0	**Disable Request**—Latch-On to remotely request that Automatic Operation (remote power control) be disabled by SCADA. Latch-Off to remotely request that Automatic Operation be enabled. This request may be overridden locally via a Remote/Local Enable/Local Disable selector switch. This request overrides the DEM's local HMI-commanded state of Automatic Operation, and must be latched-off for the DEM to assert its own power control. See CES Status Point 19 for the state of this request as seen by the DEM.
1	**Reset Alarms**—Pulse-On to reset Manual Reset Alarms. This is ignored when the local/remote selector switch is in a local position.
2	**Inhibit Islanding**—Latch-On to inhibit both Automatically and Manually Initiated Islanding by the DEM. This request overrides the DEM's local HMI-commanded state of islanding by the Unit, and must be latched-off for the DEM to assert its own manual islanding control. Latch-Off to allow either Automatic or Manual Initiation of Islanding. See CES Status Point 20 for the state of this request as seen by the DEM.
3	**Request Islanding**—Latch-On to Manually Initiate Islanding from SCADA. Latch-Off to allow Islanding return to occur (upon battery depletion, or return-to-line, if possible). This request overrides the DEM's local HMI-commanded state of islanding and must be latched-off for the DEM to assert its own islanding control. See CES Status Point 21 for the state of this request as seen by the DEM.
4-11	Reserved.

The points below are defined in the CES DEM to represent the state of each configured Tap Control device. Based on the DEM's system configuration, one "Virtual" Tap Control device will be instantiated for each single phase tap to be controlled. For a tap to be controlled with the provided algorithm, a sensing point must also be provided at the interconnection point to the feeder, or at some other suitable point on the tap where load is to be managed by the Tap Control. Correspondingly, there will be no Tap Control devices in the DNP interface and no SCADA support for the Tap Control feature is required if no Tap Controls are defined in the DEM.

The DNP and, if necessary, IP addressing and interface assignments for each Tap Control are defined during the Tap Control configuration process. Revisions to the addressing or other configurable aspects of the Tap Control take effect immediately upon any reinitialization or restarting of the Energy Dispatch (HDE) function.

Tap Control Status Points

Point #	Name—Definition
0	**Tap Control Enabled—**Set if the Tap Control is enabled at the Tap Control level. Units will not be controlled by the Tap Control unless the system-level *Tap Control Enable* is set, and the present point is also set.
1	**Information Alarm—**Information Alarms active in one or more CES Units on the tap.
2	**Warning Alarm—**Warning Alarms active in one or more CES Units on the tap.
3	**Inhibit Alarm—**Inhibit Alarms active in one or more CES Units on the tap.
4	**Isolate Alarm—**Isolate Alarms active in one or more CES Units on the tap.
5	**Trip Offline Alarm—**Trip Offline Alarms active in one or more CES Units on the tap.
6	**Load Reduction Active—**Measured tap load is above the Load Limiting setpoint and CES units are being discharged if possible to reduce load. Set if units on the tap are being commanded to reduce load. This and the two following points are mutually exclusive states described as: High (Above Demand Limit)—Load Reduction Medium (Between Limits) Low (Below Charge Limit)—Charge Requested.
7	**Charging Suppressed—**Charging of CES units is being suppressed due to tap loading being above the charge limiting setpoint. Set if the Units are not able to charge due to loading on the feeder. This point will not be set if the Tap Control logic is disabled at the Tap Control or at the system level.
8	**Charging Active—**Measured tap load indicates an opportunity to charge units if necessary. Set if tap load permits units to be charged if necessary. This point will not be set if the Tap Control logic is disabled at the Tap Control or at the system level.
9	**Communication Failure—**Tap load sensing point is unresponsive to communication requests. Set if the sensing point for the Tap Control load has not responded to a request of any kind, and a variable number of retries have failed. Cleared on a successful response to a communication request.
10	**Tap Evaluation Interval Delay—**Evaluation Interval is delayed for this tap. Set if the Adaptive Evaluation Interval feature is in delay mode for this tap.
11-15	Reserved.

Tap Control Interface

Tap Control Analog Input Points

Point #	Name—Definition
0	**Tap Control Demand**—Measured real power demand at the at the head of the tap. Each unit is kW x 10. Data Type: INT16.
1	**Tap Control VARs**—Measured reactive power demand at the head of the tap. Each unit is kVAR x 10. Data Type: INT16.
2	**Tap Control Apparent Power**—Measured apparent power demand at the head of the tap. Each unit is kVA x 10. Data Type: UINT16.
3	**Tap Control Power Factor**—Power factor associated with the apparent power (above). Each unit is PU x 1000. Data Type: INT16.
4	**Tap Control Load Reduction Limit**—Tap Control *Demand Limit/Load Reduction* setpoint. If the Tap Control is enabled, CES Units will be dispatched to reduce load to this setpoint. Each unit is kVA x 10. Data Type: UINT16.
5	**Tap Control Charge Limit**—Tap Control *Charge Limiting* setpoint. If the Tap Control is enabled, CES Units will not be allowed to charge unless the tap's measured apparent power can be held below this setpoint. Each unit is kVA x 10. Data Type: UINT16.
6	**Tap Control Voltage**—Voltage measured at the head of the tap. Each unit is PU x 1000. Data Type: UINT16.
7	**PCS Demand**—Total of the tap's CES reported Converter real power output. + for Watts to line/load from inverter (discharging/producing) – for Watts to inverter from line/load (charging/consuming). Each unit is kW x 10. Data Type: INT16.
8	**PCS VARs**—Total of the tap's CES reported Converter reactive power output. + for VARs to line/load from inverter – for VARs to inverter from line/load. Each unit is kVAR x 10. Data Type: INT16.
9	**PCS Apparent Power**—Total apparent power output of the CES Unit converters. Each unit is kVA x 10. Data Type: UINT16.
10	**PCS Power Factor**—Power factor associated with CES Unit converter output. Each unit is PU x 1000. Data Type: INT16.
11	**CES Demand Capacity**—Total nameplate rating of all of the CES units under control of the Tap Control; excludes units unavailable. Each unit is kVA x 10. Data Type: UINT16.
12	**PCS Demand Percent**—Present real power output of CES converter expressed as a percentage of nameplate rating; includes units on island. Each unit is Percent x 100. Data Type: UINT16.
13	**PCS VARs Percent**—Present reactive power output of CES converter expressed as a percentage of nameplate rating. Each unit is Percent x 100. Data Type: UINT16.
14	**PCS Apparent Power Percent**—Present apparent power output of CES converter expressed as a percentage of nameplate rating. Each unit is Percent x 100. Data Type: UINT16.
15	**Units Unavailable**—For this and the next two points, see DEM's point definitions of the same names for definitions. Each unit is Integer. Data Type: UINT16.
16	**Units Islanded**—Each unit is an integer. Data Type: UINT16.
17	**Units Dispatchable**—Each unit is an integer. Data Type: UINT16.
18-23	Reserved.

Tap Control Analog Output Points

Point #	Name—Definition
0	**Tap Control Load Reduction Setpoint—**Tap Control *Demand Limit/Load Reduction* setpoint. If the Tap Control is enabled, CES Units will be dispatched to reduce load to this setpoint. Each unit is kVA x 10. Data Type: UINT16.
1	**Tap Control Charge Limiting Setpoint—**Tap Control *Charge Limiting* setpoint. If the Tap Control is enabled, CES Units will not be allowed to charge unless the tap's measured apparent power can be held below this setpoint. Each unit is kVA x 10. Data Type: UINT16.
2-5	Reserved.

Tap Control Control Points

Point #	Name—Definition
0	**Tap Control Enable—**Enable the Tap Control logic at the local level. Pulse-On to enable, Pulse-Off to disable. In order for the feature to control discharge of the CES storage units, the System-level *TapControlEnable* must also be true/set.
1-7	Reserved.