

# 台灣電力公司配電級再生能源監控設備(再生能源監控設備/業者雲端資料系統)與 DREAMS 傳輸需求技術規範摘要

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## 一、文件說明

### (一) 名詞定義

1. DREAMS(Distributed Renewable Energy Advanced Management System): 本公司配電級再生能源管理系統
2. PV(Photovoltaic) Gateway: 再生能源監控設備
3. CL-SYS(Cloud System): 業者雲端資料系統
4. Outstation: PV Gateway 或 CL-SYS
5. DNP3.0(Distributed Network Protocol 3.0): 分布式網絡協議

### (二) 通則說明

本文係說明 Outstation 與 DREAMS 間傳輸需求技術規範，其中規範綱要、資料回傳及控制指令，如以下附錄文件:

1. 傳輸資料 DNP3.0 table 點位表請詳附錄一。
2. 傳輸資料格式請詳附錄二。
3. Outstation 應具備 DNP3.0 功能項目請詳附錄三。

## 二、訊息及資料處理

(一) DREAMS 係 DNP3.0 規定之 Master 角色，另 PV Gateway 或 CL-SYS 係 DNP3.0 規定之 Outstation 角色，皆須依據附錄三之 Profile 說明功能與 DREAMS 進行通訊。

(二) Outstation 回傳至 DREAMS 資料格式可分為 Class 0(Static)、Class1(Event)及 Class2 (Event)，如以下說明:

### 1. Static Data Solicited Response (Class0)

(1) 當 DREAMS 重新啟動或通訊中斷一段時間後(時間為參數，可調整)將執行全體資料輪詢，當 DREAMS 發出輪詢指令後，若 Outstation 無回應，DREAMS 須重新輪詢並要求 Outstation 將資料依 Class 1、Class 2、Class0 等級的順序傳送。

(2) 若輪詢結果有 Event 時，DREAMS 須以 Application Layer Confirm 回應。

(3) Outstation 資料以 Data Link Layer 規定之資料長度 (應用層 249 Bytes) 分批傳送回 DREAMS，DREAMS 於收到最後一批資料後，以 Application Layer 回應收到資料；另中間批次 Data Link Layer 傳送資料由兩端之底層 TCP 協定負責執行資料收送、確認及重送工作，Data Link Layer 無須回應資料收到。

(4) Static 資料以 Class 0 傳送，而 Event 資料則分別以 Class 1、Class 2 方式依序傳送。

## 2. Event Data Unsolicited Response(Class1)

(1) Outstation 監控設備須定時回傳 Event Data Unsolicited Response (Class 1)，回傳時間為每整點、15 分、30 分、45 分，並 24 小時不間斷，若回傳遭遇網路斷線或不穩定，須先儲存於本地端，並於連線後依序全部回傳，且最少儲存最近 1,024 筆資料，若斷線過久，採先進先出原則，則以新資料取代最舊一筆資料。

(2) 若 Outstation 傳送之 Event Data Unsolicited Response (Class 1) 資料長度超過 2,048 Bytes，則切割成兩批次以上的 Fragment，使每一 Fragment 長度小於 2,048 Bytes，並分批傳送。

(3) 另傳送所有定時回報資料時，需將 Object 32 variation 3 的 Flag 之中 Bit 7 (reserved 欄位) 改為 1，作為區分。

## 3. Event Data Change Of State (Class 2)

(1) Outstation 監控之設備資料超過 Dead Band 值後，將主動向 DREAMS 回報異動資料，並以 Event Data Change Of State (Class 2) 方式回傳，而 DREAMS 則以 Application Layer Confirm 方式確認各異動資料，若 Outstation 傳送之資料長度超過 2,048 Bytes，則切割成兩批次以上的 Fragment，使每一 Fragment 長度小於 2,048 Bytes，並分批傳送。

(2) Dead Band 檢查取樣值是否超過之頻率應為每秒一次，基準值為上一次觸發 Dead Band 的數值。

(3) 開機後 Dead Band 基準值為第一次取樣值，當量測數值為「0」，如有資料變化時，則須發送 Event Data Change Of State (Class 2) 資料。

(4) 傳送所有 Dead Band 事件資料時，需將 Object 32 variation 3 的 Flag 之中 Bit 7 (reserved 欄位) 改為 0，作為區分。

## 4. 其它指令 (含控制、參數設定指令等)

(1) 於 Static Data Solicited Response (Class 0) 傳輸過程中若有控制指令 (Write) 訊息送到 Outstation 時，則須優先處理該指令。

(2) 控制變流器之實功(P)時，DREAMS 則傳送一筆單位為「%」數值作為控制比率，該比率之分母為「變流器額定功率」，例：假

設案場變流器額定功率為 30kW，DREAMS 傳送「80」，則該變流器於監控期間之最高輸出不得超過  $30\text{kW} \times 80\% = 24\text{kW}$ 。

## Outstation 介接 DREAMS 資料傳輸規範 DNP3 .0Object Table

### 一、再生能源

(一) DI table：無。

(二) AI table

說明	點位	Value	Static Data Solicited Response (Class0)		Event Data Unsolicited Response(Class1)		Event Data Change Of State (Class 2)			附註
		單位	Object	Variation	Object	Variation	Object	Variation	Dead Band Trigger (註)	
Line Current PhaseA A 相線電流	0	0.1A	30	3	32	3	32	3	500	電表數值
Line Current PhaseB B 相線電流	1	0.1A	30	3	32	3	32	3	500	電表數值
Line Current PhaseC C 相線電流	2	0.1A	30	3	32	3	32	3	500	電表數值
Line Current PhaseN N 相線電流	3	0.1A	30	3	32	3	32	3	500	電表數值
Line Voltage Phase AB AB 線電壓	4	0.01V	30	3	32	3	32	3	100	電表數值
Line Voltage Phase BC BC 線電壓	5	0.01V	30	3	32	3	32	3	100	電表數值
Line Voltage Phase AC AC 線電壓	6	0.01V	30	3	32	3	32	3	100	電表數值
實功	7	W	30	3	32	3	32	3	200	電表數值
虛功	8	Var	30	3	32	3	32	3	500	電表數值
功率因數	9	%	30	3	32	3	32	3	100	
頻率	10	0.1Hz	30	3	32	3	32	3	50	電表數值
累積電量	11	Wh	30	6	32	6	N/A	N/A	N/A	電表數值

說明	點位	Value	Static Data Solicited Response (Class0)		Event Data Unsolicited Response(Class1)		Event Data Change Of State (Class 2)			附註
		單位	Object	Variation	Object	Variation	Object	Variation	Dead Band Trigger (註)	
日照量	12	W/m <sup>2</sup>	30	3	32	3	N/A	N/A	N/A	太陽光電案場須裝設日照計
風速	13	m/s	30	3	32	3	N/A	N/A	N/A	風力發電案場須裝設風速計
變流器功率因數設定值	14	%	30	3	32	3	32	3	Change of State	Command 範圍:+100~+90 (Lagging) 與-100~-90 (Leading)
變流器實功設定值	15	%	30	3	32	3	32	3	Change of State	Command 範圍:100~10 變流器額定功率的控制比率
變流器虛功設定值	16	%	30	3	32	3	32	3	Change of State	Reserved
變流器 Vpset 設定值	17	Int.	30	3	32	3	32	3	Change of State	Command 範圍:105、106、107、108、109
1~25 變流器是否成功接受控制	18	(25 bit)	30	3	32	3	32	3	Change of State	Default: 0 成功: 1 不成功: 0 使用第 1~25 bit 表示
26~50 變流器是否成功接受控制	19	(25 bit)	30	3	32	3	32	3	Change of State	Default: 0 成功: 1 不成功: 0 使用第 1~25 bit 表示
A 相線電流觸發 Dead Band 回傳之設定值	20	0.01%	30	3	32	3	32	3	Change of State	GW 設定值
B 相線電流	21	0.01%	30	3	32	3	32	3	Change of State	GW 設定值

說明	點位	Value	Static Data Solicited Response (Class0)		Event Data Unsolicited Response(Class1)		Event Data Change Of State (Class 2)			附註
		單位	Object	Variation	Object	Variation	Object	Variation	Dead Band Trigger (註)	
觸發 Dead Band 回傳之設定值										
C相線電流觸發 Dead Band 回傳之設定值	22	0.01%	30	3	32	3	32	3	Change of State	GW 設定值
N相線電流觸發 Dead Band 回傳之設定值	23	0.01%	30	3	32	3	32	3	Change of State	GW 設定值
AB線電壓觸發 Dead Band 回傳之設定值	24	0.01%	30	3	32	3	32	3	Change of State	GW 設定值
BC線電壓觸發 Dead Band 回傳之設定值	25	0.01%	30	3	32	3	32	3	Change of State	GW 設定值
AC線電壓觸發 Dead Band 回傳之設定值	26	0.01%	30	3	32	3	32	3	Change of State	GW 設定值
實功 Dead Band 觸發 Dead Band 回傳之設定值	27	0.01%	30	3	32	3	32	3	Change of State	GW 設定值
虛功觸發 Dead Band 回傳之設定值	28	0.01%	30	3	32	3	32	3	Change of State	GW 設定值
功率因數觸發 Dead Band 回傳之設定值	29	0.01%	30	3	32	3	32	3	Change of State	GW 設定值

說明	點位	Value	Static Data Solicited Response (Class0)		Event Data Unsolicited Response(Class1)		Event Data Change Of State (Class 2)			附註
		單位	Object	Variation	Object	Variation	Object	Variation	Dead Band Trigger (註)	
頻率觸發 Dead Band 回傳之設定值	30	0.01%	30	3	32	3	32	3	Change of State	GW 設定值
時間戳	32	unix time	30	3	32	3	N/A	N/A	N/A	

Total: 32AIs

(三) Counter table : 無。

(四) DO table : 無。

(五) AO table

說明	點位	Value	Object	Variation	附註
		單位			
設定變流器功率因數	0	%	41	2	Command 範圍:+100~+90 (Lagging) 與-100~-90 (Leading)
設定變流器實功	1	%	41	2	Command 範圍:100~10 變流器額定功率的控制比率
設定變流器虛功	2	Var	41	2	Reserved
設定變流器 Vpset	3	Int.	41	2	Command 範圍:105、106、107、108、109
設定變流器自主調控功能開啟關閉	4	-	41	2	0: 關閉 1: 開啟
設定 Line Current PhaseA A 相線電流 Dead Band 值	5	0.01%	41	2	
設定 Line Current PhaseB B 相線電流 Dead Band 值	6	0.01%	41	2	

說明	點位	Value	Object	Variation	附註
		單位			
設定 Line Current PhaseC C 相線電流 Dead Band 值	7	0.01%	41	2	
設定 Line Current PhaseN N 相線電流 Dead Band 值	8	0.01%	41	2	
設定 Line Voltage PhaseAB AB 線電壓 Dead Band 值	9	0.01%	41	2	
設定 Line Voltage PhaseBC BC 線電壓 Dead Band 值	10	0.01%	41	2	
設定 Line Voltage PhaseAC AC 線電壓 Dead Band 值	11	0.01%	41	2	
設定實功的 Dead Band 值	12	0.01%	41	2	
設定虛功的 Dead Band 值	13	0.01%	41	2	
設定功率因數 Dead Band 值	14	0.01%	41	2	
設定頻率 Dead Band 值	15	0.01%	41	2	

Total: 16 AOs

註:

1. DREAMS 向 Outstation polling 時回傳 Static Data Solicited Response (Class0)。
2. Dead Band 的基準值為上一次觸發 Dead Band 值。
3. 開機後 Dead Band 基準值為第一次取樣值。若量測數值為「0」，當有資料變化時，就須發送 Event Data Change Of State (Class 2) 資料。
4. 光電 AI 表格點位 18 及 19 「變流器是否成功受控」之欄位，Outstation 需在下達指令前將此兩點位歸零，使變流器執行後，藉由 Dead Band 變動回傳。
5. AI 表格 Class 2 Dead Band Trigger 欄位，與 AO 表格的單位欄位相乘使用。例如 AI 點位 0 的 Dead Band Trigger 數值為 500，與 AO 點位 5 的單位 0.01% 相乘，代表 A 相線電流 Dead Band 超過 5% 會觸發。



二、儲能系統

(一) DI table：無。

(二) AI table

說明	點位	Value	Static Data Solicited Response (Class0)		Event Data Unsolicited Response(Class1)		Event Data Change Of State (Class 2)			附註
		單位	Object	Variation	Object	Variation	Object	Variation	Dead Band Trigger (註)	
Line Current PhaseA A 相線電流	0	0.1A	30	3	32	3	32	3	500	電表數值
Line Current PhaseB B 相線電流	1	0.1A	30	3	32	3	32	3	500	電表數值
Line Current PhaseC C 相線電流	2	0.1A	30	3	32	3	32	3	500	電表數值
Line Current PhaseN N 相線電流	3	0.1A	30	3	32	3	32	3	500	電表數值
Line Voltage Phase AB AB 線電壓	4	0.01V	30	3	32	3	32	3	100	電表數值 併聯點電壓 (kV)
Line Voltage Phase BC BC 線電壓	5	0.01V	30	3	32	3	32	3	100	電表數值
Line Voltage Phase AC AC 線電壓	6	0.01V	30	3	32	3	32	3	100	電表數值
實功	7	kW	30	3	32	3	32	3	200	電表數值 放電時為正值
虛功	8	kVar	30	3	32	3	32	3	500	電表數值
功率因數	9	%	30	3	32	3	32	3	100	並聯點
頻率	10	0.1Hz	30	3	32	3	32	3	50	電表數值
累積放電量	11	kWh	30	6	32	6	N/A	N/A	N/A	電表數值
累積充電量	12	kWh	30	6	32	6	N/A	N/A	N/A	電表數值
儲能系統狀態	13	-	30	3	32	3	N/A	N/A	N/A	0: stand by 1: charging

說明	點位	Value	Static Data Solicited Response (Class0)		Event Data Unsolicited Response(Class1)		Event Data Change Of State (Class 2)			附註
		單位	Object	Variation	Object	Variation	Object	Variation	Dead Band Trigger (註)	
										2. discharging 3. error (註)
儲能系統電量(SOC)	14	kWh	30	3	32	3	32	3	N/A	儲能系統數值
儲能系統循環使用次數 (battery cycle count)	15	-	30	6	32	6	N/A	N/A	N/A	儲能系統數值 (註)
時間戳	16	unix time	30	3	32	3	N/A	N/A	N/A	

Total: 17 Ais

(一) Counter table : 無。

(二) DO table : 無。

(三) AO table

說明	點位	Value	Object	Variation	附註
		單位			
設定 Line Current PhaseA A 相線電流 Dead Band 值	0	0.01%	41	2	
設定 Line Current PhaseB B 相線電流 Dead Band 值	1	0.01%	41	2	
設定 Line Current PhaseC C 相線電流 Dead Band 值	2	0.01%	41	2	
設定 Line Current PhaseN N 相線電流 Dead Band 值	3	0.01%	41	2	
設定 Line Voltage PhaseAB AB 線電壓 Dead Band 值	4	0.01%	41	2	
設定 Line Voltage PhaseBC BC 線電壓 Dead Band 值	5	0.01%	41	2	

說明	點位	Value	Object	Variation	附註
		單位			
設定 Line Voltage PhaseAC AC 線電壓 Dead Band 值	6	0.01%	41	2	
設定實功的 Dead Band 值	7	0.01%	41	2	
設定虛功的 Dead Band 值	8	0.01%	41	2	
設定功率因數 Dead Band 值	9	0.01%	41	2	
設定頻率 Dead Band 值	10	0.01%	41	2	

Total: 11 AOs

註:

1. 儲能系統狀態(點位 13)的 error 定義為儲能系統無法正常充放電。
2. 儲能系統循環使用次數(點位 15) 定義為累計輸出電量/電池的建置容量。
3. DREAMS 向 Outstation polling 時回傳 Static Data Solicited Response (Class0)。
4. Dead Band 的基準值為上一次觸發 Dead Band 值。
5. 開機後 Dead Band 基準值為第一次取樣值。若量測數值為「0」，當有資料變化時，就須發送 Event Data Change Of State (Class 2)資料。
6. 光電 AI 表格點位 18 及 19 「變流器是否成功受控」之欄位，Outstation 需在下達指令前將此兩點位歸零，使變流器執行後，藉由 Dead Band 變動回傳。
7. AI 表格 Class 2 Dead Band Trigger 欄位，與 AO 表格的單位欄位相乘使用。例如 AI 點位 0 的 Dead Band Trigger 數值為 500，與 AO 點位 5 的單位 0.01%相乘，代表 A 相線電流 Dead Band 超過 5% 會觸發。

## Outstation 與 DREAMS 間傳輸格式

### 一、名詞定義

- (一) Master : DREAMS (配電級再生能源發電系統)
- (二) Outstation: PV Gateway(再生能源監控設備)或 CL-SYS(業者雲端資料系統，業者自建的 PV 光電監控雲端系統)
- (三) Static Data Solicited Response (Class0) : 輪詢傳輸
- (四) Event Data Unsolicited Response(Class1): 定時回報 (每 15 分鐘定時回報所有欄位數值)
- (五) Event Data Change Of State (Class 2) : Dead Band 事件回報

### 二、DREAMS 向 Outstation 連線與資料傳輸

DREAMS 向 Outstation 輪詢資料，須參照附錄一點位表中 Static Data Solicited Response (Class0)欄位所定義的 object 和 variation。

#### (一) DREAMS 輪詢傳輸 Static Data Solicited Response

項次	Trigger	Master	Outstation	Comments
1	DREAMS 主動或手動	Object 60, variation 2, 1, function 1		Read request for class 1, 0 -all "event" and "static" data (AI)
<b>Case 1:如 Outstation 正常回應，請參考本表項次 2。</b>				
2			Object 30, variation 3 (Static: Solicited Responses)	If there are events in any class, report the "event" first, then report all the "static" data. 32 Bit Analog Input - No Flag If respond with the "event", then expect confirmation.
3		"Confirmation" Upon getting the response from the outstation, then Comm.  the status of each of the Outstation in the database will be set to "0", and those "event" will be sent to the DREAMS.		Application Layer
<b>Case 2:如 Outstation 無回應，請參考本表項次 4。</b>				
4	No Response After Timeout	1. Try once more on Object 60, variation 2, 1, function 1.		Application layer try once more. If success, 至項次 2

項次	Trigger	Master	Outstation	Comments
		2. If the Outstation no response, the 1 <sup>st</sup> bit of this Outstation section in the DREAMS database is "1" and the alert sent to DREAMS.		The Communication status bit to the outstation is set to "1". 參考(六)

(二) DREAMS 重啟機制

1. DREAMS 於重啟時，與 Outstation 為離線的狀態，當 DREAMS 完成重啟程序後，則須以 Static Data Solicited Response 向 Outstation 輪詢資料。
2. 另 DREAMS 須向 每一個 Outstation 發送 Static Data Solicited Response 確認通訊狀態。

項次	Trigger	Master	Outstation	Comments
1	DREAMS 重啟	All the bits of Comm. Status with Outstation 's will be set to" 1".		One by one, DREAMS do integrity polling for outstation.
2		Object 60, variation 2, 1, function 1		Read Request for class 1,0 -all event and static data (AI)
3			Object 30, variation 3 (Static: Solicited Responses)	If there are events in any class, report the event first, then report all the static data. 32 Bit Analog Input - No Flag If response with the events, then expect confirmation.
4		"Confirmation" Upon getting the response from the Outstation, then Comm. status of each of the Outstation in the database will be set to "0".		Application Layer
<p><b>DREAMS 向所有 Outstation 確認連線狀態後，將有以下情形：</b></p> <p><b>Case 1: Outstation 沒有回應，請參考二、(五) Outstation 無回應。</b></p> <p><b>Case 2: DREAMS 要求執行 AO 控制指令，請參考五、AO 控制。</b></p> <p><b>Case 3: 任一 Outstation 重啟 bit IIN Set1，請參考本表項次 5。</b></p> <p><b>Case 4: Outstation Event 回傳，請參考 (四) Outstation Event 回傳 Class 1。</b></p>				
5		Object 80, variation 1, function 2		Master clears the "Restart" IIN bit

6			Response	
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(三) Outstation 重啟機制

Outstation 完成重啟程序之後，應回傳第一筆定時資料 Event Data Unsolicited Response(Class1)。

項次	Trigger	Master	Outstation	Comments
1				Comm. Status with Outstation have been set to "1". DREAMS defer the polling period of this Outstation.
2	Outstation 重啟		Waits for a communication with the DREAMS	
3			Object 32, variation 3 Event: Unsolicited Responses (Class 1)	If there are events in any class. 32 Bit AI Event - with Time Flag bit7: Set 1 Response with the events and expects confirmation.(If there are events reported) Bits of Restart IIN are 1.
4		Confirmation		Application Layer

Case 1: Restart bit IIN set 1，請參考本表項次 5。

5		Object 80, variation 1, function 2		Master clears the "Restart" IIN bit
6			Response	

(四) Outstation 定時回報 Event Data Unsolicited Response(Class1)

Outstation 在以下狀態，將主動回傳 Event Data Unsolicited Response(Class1)資料:

1. Outstation 完成重啟程序後，須回傳第一筆 Event Data Unsolicited Response(Class1)完整資料。
2. Outstation 於定時（整點、15分、30分、45分）須回傳 Event Data Unsolicited Response(Class1)完整資料。

項次	Trigger	Master	Outstation	Comments
1	Outstation 定時或重啟		Object 30, variation 3 (Event Data Unsolicited Response(Class1))	Read Request for Events. DREAMS issues a polling message to

項次	Trigger	Master	Outstation	Comments
			If there is an event in AI: Object 32, variation 3 (Event)	an Outstation, after completion of previous Outstation polling (either successful or retry time-out)
<b>Case 1: DREAMS 有回應，請參考本表項次 2。</b>				
2		Object 30, variation 3 (Event Data Unsolicited Response(Class1) If there is an event in AI: Object 32, variation 3 (Event) Don't send Data Change fail alarm single.		32 Bit AI Event - with Time
3		If received events, confirm the events.		
<b>Case 2: DREAMS 無回應且上一次通訊為正常狀態，請參考本表項次 4。</b>				
4	No Response After Timeout		1. Try once more on Object 60, variation 2, function 1 2. If Outstation no response, the 1 <sup>st</sup> bit of this Outstation Section in the DREAMS database is 1 and the alert should show DNP3.0 disconnected in DREAMS. 3. This process to the failed Outstation is suspended until the renewal of the communication.	Application layer try once more. If success, 至項次 2 The Communication status bit to the Outstation is set to" 1".參考(六)

(五) Outstation 無回應

當 DREAMS 嘗試與 Outstation 建立連線，Outstation 無回應。

項次	Trigger	Master	Outstation	Comments
1	Outstation. 無回應			The trigger is following Events Read Request, Integrity Check.
<b>Case 1: Outstation 無回應，請參考本表項次 2。</b>				
2		1. Try once more on relative Object,		The Database of the Outstation will

項次	Trigger	Master	Outstation	Comments
		variation, and function 2. If Outstation no response, the 1 <sup>st</sup> bit of this Outstation Section in the DREAMS database is “1” and the alert show to DREAMS. 3. The Event Polling to the failed Outstation is suspended until the renewal of the communication.		remain unchanged except for the Comm. Status bit. 參考(六)
Case 2: 所有 Outstation 都無回應，請參考本表項次 3。				
3		The indication of Fail to this specific port is set to “1” and the alert show to DREAMS.		The Database of all the Outstation's under this port will remain unchanged except for the Comm. Status bit. 參考(六)

(六) Outstation 恢復通訊

Outstation 無回應與無自主回報一段時間後，Outstation 恢復通訊。

項次	Trigger	Master	Outstation	Comments
1	Failed Outstation Responds to Integrity Polling or failed to Unsolicited Response data	Object 60, variation 2, 1, function 1		Read Request for class1, 0 -all event and static data (AI)
2			Object 32, variation 3 Event Data Unsolicited Response(Class1)	If Outstation communication recovery, there are events in any class, report all the “static” data first. 32 Bit AI Event - with Time Flag bit7: Set 1 32 Bit Analog Input - No Flag If response with the events, then confirmation expects.
3		“Confirmation” Upon getting the response from the Outstation, the Comm. status of each of the Outstation in the		Application Layer



項次	Trigger	Master	Outstation	Comments
		database will be set to "0".		

(七) 確認 Outstation 連線狀態

以下情形 DREAMS 需與 Outstation 確認連線及重新建立連線:

1. Outstation 重啟或網路斷線後重新連線。
2. DREAMS 一分鐘內沒收到 Outstation 回傳資料。
3. DREAMS 重啟後。

項次	Trigger	Master	Outstation	Comments
1	DREAMS 一分鐘內沒有收到 Outstation 回傳資料	Object 80, variation 1, function 1		Sends "Read Internal Indications" as "Keep Alive".
<b>Case 1: Outstation 有回應，請參考本表項次 2。</b>				
2		Object 80, variation 1		Responds with the current IIN.
3	Received response	The timer of "Keep Alive" starts again.		
<b>Case 2: Outstation 無回應且上一次通訊為正常狀態，請參考本表項次 4。</b>				
4		1. Try once more on object 80, variation 1, function 1 2. If Outstation no response, the 1 <sup>st</sup> bit of the Outstation database in the DREAMS is 1 and the alert show to DREAMS.		The Database of the Outstation will remain unchanged except for the Comm. Status bit.

三、 Outstation 回傳資料到 DREAMS(定時)

(一) Outstation 定時回傳資料至 DREAMS 須參照附錄一點位表中 Event Data Unsolicited Response(Class1)所定義的 object 和 variation 欄位。

(二) Outstation 在以下狀態，將主動回傳 Event Data Unsolicited Response(Class1)資料：

1. Outstation 完成重啟後，須回傳第一筆 Event Data Unsolicited Response(Class1)完整資料，並傳送所有定時回報資料時，需將 Object 32 variation 3 的 Flag 之中 Bit 7 (reserved 欄位)改為 1 作為區分。
2. Outstation 定時（整點、15 分、30 分、45 分）須回傳 Event Data Unsolicited Response(Class1)完整資料，並傳送定時資料時，需將

Object 32 variation 3 的 Flag 之中 Bit 7 (reserved 欄位)改為 1 作為區分。

項次	Trigger	Master	Outstation	Comments
1	On every integral point, 15, 30 and 45 minutes of the hour (定時觸發) or Outstation 重啟後觸發		Send unsolicited message and request for confirmation possible events reports: Object 32, variation 3 Event Data Unsolicited Response(Class1)	32 Bit AI Event - with Time Flag bit7: Set 1
<b>Case 1: DREAMS 回應，請參考本表項次 2。</b>				
2		Confirm		Application Layer
3			Send next Event Data Unsolicited Response(Class1)and request for confirmation	Outstation's 'Unsolicited responses Buffer' full up or 'Enforce Data Send Timer' time's up (default 0.5 second), then Outstation send the next response.
<b>Case 2: DREAMS 無回應，請參考本表項次 4。</b>				
4	無回應		The DREAMS waits for a timeout. Send Event Data Unsolicited Response(Class1) and request for confirmation once again.	The unsolicited response confirmation timeout is configurable (default is 5 sec)

(三) DREAMS 重啟

1. DREAMS 於重啟時，和 Outstation 處於斷線的狀態，於傳送定時資料會失敗。
2. 當 DREAMS 完成重啟後，DREAMS 向 Outstation 發送 class 0 scan request 確認每一個 Outstation 通訊狀態。
3. 恢復連線後，Outstation 應恢復定時回報。

項次	Trigger	Master	Outstation	Comments
1	DREAMS 重啟	All the bits of Comm. Status with Outstation will be set to "1"		The 1 <sup>st</sup> bit in the Outstation section in the DREAMS Database
2			Maybe Outstation has events reports immediately.	Maybe the Outstation is in

項次	Trigger	Master	Outstation	Comments
			Object 32, variation 3 Event Data Unsolicited Response(Class1) Object 32, variation 3 Event Data Change Of State (Class 2)	unsolicited report mode. 32 Bit AI Event - with Time Flag bit7: Set 1 32 Bit AI Event - with Time Flag bit7: Set 0
3		Process data, confirm the message at the application layer level		If Outstation sent events
4		Object 60, variation 2 , function 1		One by one, Sends Disable unsolicited events to Outstation
5			Response	
6		Object 60, variation 2, function 1		One by one, read request for class 1 all event and static data (AI)
7			Object 32, variation 3 (Event) Object 30, variation 3 Event Data Unsolicited Response(Class1)	If there are events in any class, report the event first, then report all the static data. 32 Bit AI Event-with Time 32 Bit Analog Input – No Flag If response with the events, then expects confirmation.
8		“Confirmation “ Upon getting the response from the Outstation, then Comm. status of each of the Outstation in the database will be set to "0".		Application Layer
9		Object 60, variation 2, function 1.		One by one, sends Enable unsolicited events.
10			Response.	

(四) Outstation 重啟

Outstation 完成重啟後，須自主回傳 Event data unsolicited response(Class 1)。

項次	Trigger	Master	Outstation	Comments
1	Outstation 重啟		Sends null unsolicited messages.	Outstation restart, then send null unsolicited message automatically. Bits of Restart IIN are 1.
2		Confirmation		Application Layer
3		Object 60, variation 2, function 1		Sends Disable unsolicited events.
4			Response	
5		Object 80, variation 1, function 2		Master clears the "Restart" IIN bit
6			Response	
7		Object 60, variation 2, function 1		Read request for class 1 -all event and static data (AI)
8			Object 32, variation 3 Event data unsolicited response(Class 1) Object 32, variation 3 Event: Data Change (Class 2)	Response with the static data and the events. Expects confirmation on the events. 32 Bit AI Event - with Time Flag bit7: Set 1 32 Bit AI Event - with Time Flag bit7: Set 0 Response with the events and expects confirmation.
9		Confirmation		Application Layer
10		Object 60, variation 2,function 1		Sends Enable unsolicited events.
11			Response.	If more events were stored from last response, the response will be with those events and expects confirmation on the events.

#### 四、Outstation 回傳資料到 DREAMS (Dead Band)

DREAMS 回傳 Dead Band 資料至 DREAMS 須參照附錄一點位表中 Event data change of state (Class 2)所定義的 object 和 variation 欄位，並依以下方式回傳：

- (一) Outstation 須透過 DNP3.0 Event，於案場量測值超過 Dead Band 時，須回報 DREAMS 數值資料。
- (二) 傳送所有 Dead Band 事件資料時，須將 Object 32 variation 3 的 Flag 之中 Bit 7 (reserved 欄位)改為 0 作為區分。

項次	Trigger 觸發	Master	Outstation	Comments
1	AI 點位數值超所設定的閾值		Send Event data change of state (Class 2) and request for confirmation possible events reports: Object 32, variation 3 Event data change of state (Class 2)	32 Bit AI Event - with Time Flag bit7: Set 0
<b>Case 1: DREAMS 有回應，請參考本表項次 2。</b>				
2		Confirm		Application Layer
3			Send next Event in Unsolicited message and request for confirmation	Outstation's 'Unsolicited response Buffer' full up or 'Enforce Data Send Timer' time's up (default 0.5 second), then Outstation send the next response.
<b>Case 2: DREAMS 無回應，請參考本表項次 4。</b>				
4	無回應		The DREAMS waits a timeout. Send "Event data change of state (Class 2) and request for confirmation once again.	The unsolicited response confirmation timeout is configurable (default is 5 sec)

#### 五、AO 點設定及控制

DREAMS 系統中有以下 2 種控制功能：

- (一) 可透過指令予 Outstation 設定變流器的實功、虛功、Vpset、功率因數等。
- (二) 設定案場中「電表欄位」的 Dead Band 值，若 Outstation 為再生能源監控設備，則設定該資料蒐集器所在案場之 Dead Band 值。

若 Outstation 為業者雲端資料系統，則將電號轉化為案場，並設定該案場 Dead Band 值。

項次	Trigger	Master	Outstation	Comments
<b>Case 1: Communication to the Outstation 正常，請參考本表項次 1。</b>				
1		Object 41, variation 2, function 5 (Direct Operate)		
2			confirm	
3			In the event of successful, the referred AI (Point No. 14~33) in the database of the Outstation will get the value. The change in the AI generates Event. In the event of failure, the referred AI (Point No. 14~33) in the database of the Outstation will keep the original value.	
4		Object 60, variation 2, 1, function 1		Read request for class 1, 0 -all "event" and "static" data (AI)
5			Object 30, variation 3 Event data unsolicited response(Class 1) Object 32, variation 3 (Event)	If there are events in any class, report the event first, then report all the static data. 32 Bit AI Event - with Time 32 Bit AI Event - with Time If response with the events, then expects confirmation.
6		Confirm.		
<b>Case 2: Outstation 無回應且上一次連線狀態正常，請參考本表項次 7。</b>				
7		The indication of Fail to this specific Outstation is set to "1" and the alert show to DREAMS.		The value of the referred AI of the database of this Outstation will keep the original value.

# DNP3.0 Profile Outstation 應具備功能項目

<b>DNP3.0</b>	
<b>DEVICE PROFILE DOCUMENT for Outstation Upstream Communication Requirement</b>	
Outstation 與 DREAMS 通訊之的 DNP3.0(Outstation)通訊協定須滿足以下需求:	
Vendor Name:	
Device Name:	
Highest DNP3.0 Level Supported: (參閱 DNP3.0 功能項目表) For Requests: For Responses:	Device Function: <input type="checkbox"/> Master <input checked="" type="checkbox"/> Outstation
Notable objects, functions, and/or qualifiers supported in addition to the Highest DNP3.0 Levels Supported (the complete list is described in the attached table): 本公司以 "DNP3.0 功能項目表" 所列之 object、variation、function 及/或 qualifier 為 Outstation 應提供之功能項目。	
Maximum Data Link Frame Size (octets): Transmitted <u>292</u> Received <u>292</u>	Maximum Application Fragment Size (octets): Transmitted <u>2,048</u> Received <u>2,048</u>
Maximum Data Link Re-tries: None Fixed <input checked="" type="checkbox"/> Configurable range, range <u>0</u> to <u>5</u>	Maximum Application Layer Re-tries: <input checked="" type="checkbox"/> None Fixed Configurable range, range <u>   </u> to <u>   </u>
Requires Data Link Layer Confirmation: <input checked="" type="checkbox"/> Sometimes If 'Sometimes', when? <u>請參閱傳輸需求技術規範</u>	
Requires Application Layer Confirmation: <input type="checkbox"/> Never <input type="checkbox"/> Always (not recommended) <input type="checkbox"/> When reporting Event Data (Slave devices only) <input type="checkbox"/> When sending multi-fragment responses (Slave devices only) <input checked="" type="checkbox"/> Sometimes If 'Sometimes', when? <u>請參閱傳輸需求技術規範</u> <input type="checkbox"/> Configurable If 'Configurable', how? _____	
Timeouts while waiting for: Data Link Confirm <input checked="" type="checkbox"/> None <input type="checkbox"/> Fixed at _____ <input type="checkbox"/> Variable <input type="checkbox"/> Configurable Complete Appl. Fragment <input checked="" type="checkbox"/> None <input type="checkbox"/> Fixed at _____ <input type="checkbox"/> Variable <input type="checkbox"/> Configurable Application Confirm <input type="checkbox"/> None <input type="checkbox"/> Fixed at _____ <input type="checkbox"/> Variable <input checked="" type="checkbox"/> Configurable Complete Appl. Response <input checked="" type="checkbox"/> None <input type="checkbox"/> Fixed at _____ <input type="checkbox"/> Variable <input type="checkbox"/> Configurable Others: <u>Configurable timeout 時間 = 5 秒(預設值)</u>	
Sends/Executes Control Operations: WRITE Binary Outputs <input checked="" type="checkbox"/> Never <input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input type="checkbox"/> Configurable SELECT/OPERATE <input type="checkbox"/> Never <input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input checked="" type="checkbox"/> Configurable DIRECT OPERATE <input type="checkbox"/> Never <input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input checked="" type="checkbox"/> Configurable DIRECT OPERATE - NO ACK <input type="checkbox"/> Never <input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input checked="" type="checkbox"/> Configurable Count > 1 <input checked="" type="checkbox"/> Never <input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input type="checkbox"/> Configurable Pulse On <input checked="" type="checkbox"/> Never <input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input type="checkbox"/> Configurable Pulse Off <input checked="" type="checkbox"/> Never <input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input type="checkbox"/> Configurable Latch On <input checked="" type="checkbox"/> Never <input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input type="checkbox"/> Configurable Latch Off <input checked="" type="checkbox"/> Never <input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input type="checkbox"/> Configurable Attach explanation if 'Sometimes' or 'Configurable' was checked for any operation:	
<b>FILL OUT THE FOLLOWING ITEM FOR MASTER DEVICES ONLY:</b>	
Expects Binary Input Change Events: <input type="checkbox"/> Either time-tagged or non-time-tagged for a single event <input type="checkbox"/> Both time-tagged and non-time-tagged for a single event <input type="checkbox"/> Configurable (attach explanation)	
<b>FILL OUT THE FOLLOWING ITEMS FOR OUTSTATION DEVICES ONLY:</b>	

Reports Binary Input Change Events when no specific variation requested: <input checked="" type="checkbox"/> Never <input type="checkbox"/> Only time-tagged <input type="checkbox"/> Only non-time-tagged <input type="checkbox"/> Configurable to send both, one or the other 依下列原則處理: 1. Class0 規劃為 Binary Input Event non-time-tagged 及 time-tagged. 2. Class1 規劃為 Analog Input Event.	Reports time-tagged Binary Input Change Events when no specific variation requested: <input checked="" type="checkbox"/> Never <input type="checkbox"/> Binary Input Change With Time <input type="checkbox"/> Binary Input Change With Relative Time <input type="checkbox"/> Configurable
Sends Unsolicited Responses: <input type="checkbox"/> Never <input checked="" type="checkbox"/> Configurable (參考”Scenarios”說明) <input type="checkbox"/> Only certain objects <input type="checkbox"/> Sometimes (attach explanation) <input type="checkbox"/> Enable/Disable Unsolicited Function code supported	Sends Static Data in Unsolicited Responses: <input checked="" type="checkbox"/> Never <input type="checkbox"/> When Device Restarts <input type="checkbox"/> When Status Flags Change No other options are permitted.
Default Counter Object/Variation: <input checked="" type="checkbox"/> No Counters Reported <input type="checkbox"/> Configurable (attach explanation) <input type="checkbox"/> Default Object _____ Default Variation _____ <input type="checkbox"/> Point-by-point list attached Default	Counters Roll Over at: <input checked="" type="checkbox"/> No Counters Reported <input type="checkbox"/> Configurable (attach explanation) <input type="checkbox"/> 16 Bits <input type="checkbox"/> 32 Bits <input type="checkbox"/> Other Value _____ <input type="checkbox"/> Point-by-point list attached
Sends Multi-Fragment Responses: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

● DNP3.0 功能項目表

Object			Request 須會解析之指令		Response 須可送出之回應	
Obj	Var	Description	Func Codes (dec)	Qual Codes (hex)	Func Codes (dec)	Qual Codes (hex)
30	3	32-Bit Analog Input without Flag			129	0,1
32	3	32-Bit Analog Change Event with Time			129,130	17,28
41	2	16-Bit Analog Output Block	3,4,5,6	17,28	129	Echo of Request
60	1	Class 0 Data(Static)	1	6		
60	2	Class 1 Data(Event)	1	6,7,8		
60	3	Class 2 Data(Event)	1	6,7,8		
80	1	Internal Indications	1,2	0 (index=7)		

註：

1. Outstation 須符合本附錄所提及之規範。
2. Outstation 須接受 Static data solicited response (Class 0) (全體輪詢) 及 Event Data Unsolicited Response (定時主動回報)，以及 Event Data Change of state (Dead Band 事件回報) 方式傳送異動資料。