Data Communications Company

WAN Selection Arrangements

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Table of Contents

1. Introduction

This document sets out the Wide Area Network (WAN) Selection Arrangements applicable to Virtual WAN Communications Hubs (VWCHs) deployed under the Smart Metering Implementation Programme (SMIP).

It sets out how VWCHs operate when equipped with dual WAN interfaces - a 4G Smart Metering Wide Area Network (SMWAN) interface and a Virtual WAN (VWAN) interface via the Virtual WAN Device (VWD), and the criteria used to select the active WAN interface.

2. Overview of WAN interfaces on VWCH

2.1. Virtual WAN Communications Hub

VWCHs are equipped with two WAN interfaces:

- Cellular SMWAN Interface: Standard 4G cellular-based WAN interface; and
- VWAN Interface: A secure communication interface that utilises a VWD and the consumer's broadband internet connection.

At any point in time, only one WAN interface of the VWCH shall be active for communication with Remote Parties. The selection of the active WAN interface is based on:

- Primary WAN interface configuration – determined by the *WANRoutePriority* parameter.
- WAN link state assessment: the real time operation state of each interface.

If the configured primary interface is unavailable or degraded, the VWCH may initiate a failover to the secondary interface, subject to defined criteria and conditions.

This interface management approach supports resilient communication between the VWCH and the DCC, helping to minimise disruption and maintain operational continuity.

2.2. Primary WAN interface

The VWCH includes a configurable parameter, *WANRoutePriority*, which determines the primary WAN interface for operational use. The parameter takes one of the following values:

- **0 (default)**: The cellular (4G) interface is the primary WAN interface; or
- **1**: The VWAN interface is the primary WAN interface.

Unless explicitly modified, *WANRoutePriority* will be set to a default value of **0** at the point of manufacture, meaning VWCH will prioritise the 4G cellular WAN interface during both Installation and Commissioning (I&C) and business as usual operations.

The *WANRoutePriority* parameter:

- is set during the manufacturing process;
- will not change by VWCH firmware updates;
- persists through power cycles; and
- can be updated post-installation by the DCC (see Appendix A).

2.3. WAN interface link state detection

Each VWCH Device performs periodic monitoring of its available WAN interfaces in order to determine their operational status. This monitoring is undertaken independently for each WAN interface, at intervals configurable by the DCC, as follows:

- *CellularConnectionMonitorInterval*: the interval, in minutes, over which the 4G cellular WAN interface is monitored. The value will be set as 60 minutes for the VWCH manufactured for the VWAN Soft Launch.
- *VWANConnectionMonitorInterval*: the interval, in minutes, over which the VWAN interface is monitored. The value will be set as 60 minutes for the VWCH manufactured for the VWAN Soft Launch.

2.3.1. Cellular interface link state

Upon power-up, the cellular modem in the VWCH scans for available 4G signal and establishes a connection where adequate coverage exists. The VWCH modem is designed to maintain this connection and automatically re-establish it following any network disconnection or service interruption.

Each time the modem connects to, or disconnects from the 4G network, it generates an event notification, which is sent to the Communications Hub Function (CHF) application within the VWCH. The VWCH uses these events to update its internal status to indicate whether the cellular connection is active or inactive.

The cellular interface link state is considered to be good at the end of the configured monitoring period, if this status remains active throughout the configured monitoring period (*CellularConnectionMonitorInterval*).

2.3.2. VWAN interface link state

The VWAN link is established over two distinct network connections:

- A ZigBee connection between the VWCH and the VWD; and
- An IP based connection using the internet between the VWD and the DCC.

To ensure the VWAN link remains active and secure, the VWCH periodically exchanges authenticated heartbeat messages with the DCC systems at a configurable interval (see Appendix A) even if VWCH is operating using cellular interface link.

The VWAN interface link state is considered to be good at the end of the configured monitoring period, if the VWCH receives at least one authenticated message from the DCC (Data Service

Provider (DSP), Device Manager (DM) or Virtual WAN Provider (VWP)) throughout the configured monitoring period *(VWANConnectionMonitorInterval*).

2.4. WAN link state assessment

At each monitoring interval, VWCH evaluates the state of both WAN interfaces and determines whether to retain or switch the active WAN interface based on:

- Current *WANRoutePriority*; and
- Link state of each WAN interface.

The decision logic is as follows:

Primary WAN Interface	Cellular interface link state	VWAN interface link state	Active WAN interface
Cellular (default)	Good	Good	Cellular
	Good	Not good	Cellular
	Not good	Good	VWAN
	Not good	Not good	unchanged
VWAN (if *WANRoutePriority* is explicitly modified by the DCC)	Good	Good	VWAN
	Good	Not good	Cellular
	Not good	Good	VWAN
	Not good	Not good	unchanged

Switching between WAN interfaces result in a WAN Route Switch Alert being sent to the Device Manager. These alerts are not sent to DCC Users.

However, the current active WAN interface of the VWCH is visible to DCC Users in the following way:

- Self-Service Interface (SSI) application displays a “Connectivity” attribute if the VWCH has an associated VWD and indicate the current active WAN interface (Cellular or Virtual).
- SRV 8.2 – ‘Read Inventory’ response provides the “Connectivity” attribute if the DCC User is using the DCC User Interface Specification (DUIS) v5.4 schema or later.

Appendix A – VWCH parameters for WAN Selection Arrangements

The following VWCH parameters are configured at manufacturing.

VWCH Parameters	Values for the VWAN soft launch	Notes
WANRoutePriority	0	VWCH uses this to set the Primary WAN interface. Allowed values are: • 0 (default) - indicates cellular has priority over VWAN. • 1 - indicates VWAN has priority over cellular.
CellularConnectionMonitorInterval	60	Value in minutes. The interval over which the cellular connection is monitored to detect the link state.
VWANConnectionMonitorInterval	60	Value in minutes. The interval over which the VWAN connection is monitored to detect the link state.
CellularRouteVWPHealthCheckInterval	30	Value in minutes. The interval between VWAN heartbeat messages, which applies when cellular is the active WAN interface and no inbound messages have been received over VWAN during that period Note- While the VWCH operates over the cellular interface, VWAN heartbeat messages continue to be exchanged to maintain the

		VWAN link and enable timely failover if necessary.
VWANRouteVWPHealthCheckInterval	30	Value in minutes. The interval between VWAN heartbeat messages, which applies when VWAN is the active WAN interface and no inbound messages have been received over VWAN during that period Note- VWAN heartbeat messages continue to be exchanged to maintain the VWAN link.

The DCC may update these parameters for individual VWCH after installation, to optimise WAN link performance and ensure alignment with operational requirements. Updates will be delivered via commands to the VWCH from the Device Manager over the active WAN interface.

Appendix B – VWAN scenarios

This section is for information only.

Scenario	Site features	I&C process in high level	Notes
1	Good 4G signal	1. Pre-notify the Devices. 2. Install SMS and commission Devices. • If a PPMID or IHD or CAD with VWD capability is already commissioned and Wi-Fi is configured, VWAN route will be enabled automatically via a nightly batch process. Note - VWD installation can also be completed using enhanced InterPAN, as per scenario #2.	• VWCH will default to 4G cellular network upon power up due to strong 4G signal availability. • If a VWD is installed and Wi-Fi is configured, VWAN will be enabled in the background, but the VWCH will continue operating over 4G cellular.
2	No 4G signal	1. Pre-notify the Devices. 2. Configure Wi-Fi on the VWD. 3. Initiate enhanced interPAN between the VWCH and the VWD. 4. Install SMS and commission Devices once VWAN is established.	• VWCH will operate over the VWAN despite 4G cellular being the primary WAN (by default). • If 4G cellular becomes available in future and remains stable for 60 minutes, the VWCH will switch to 4G cellular (as cellular is priority by default).
3	Intermittent 4G signal	Case A: 4G is available during I&C but interrupted thereafter: 1. Follow process in scenario #1	Post-commissioning behaviour: • VWCH will operate using the WAN available during commissioning. • If operating over 4G and the cellular link is disrupted within the 60 minutes monitoring period while VWAN remain stable for the same duration, the VWCH will switch to VWAN. • If operating over VWAN and 4G returns with good link state for 60 minutes, the VWCH will revert to 4G (cellular remain the default priority).
		Case B: No 4G during I&C but available after I&C: 1. Follow process in scenario #2	
		Case C: 4G cellular network is intermittent post-commissioning.	