

# **UCCP Satellite Fast Scan Register Description Document**

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## Contents

<b>1.</b>	<b>Introduction .....</b>	<b>3</b>
<b>2.</b>	<b>System Operation .....</b>	<b>3</b>
2.1.	Basic Operating Sequence.....	4
2.2.	API Terminology .....	5
<b>3.</b>	<b>Register Set .....</b>	<b>5</b>
3.1.	Identification Registers .....	5
3.1.1.	Fast Scan API Version .....	5
3.1.2.	Fast Scan Firmware Version .....	6
3.1.3.	Fast Scan Build ID.....	6
3.2.	Basic System Control .....	6
3.2.1.	System Control .....	6
3.2.2.	System State .....	6
3.2.3.	Scan Progress.....	7
3.2.4.	Active Secondary API.....	7
3.3.	Scan Parameters .....	7
3.3.1.	Scan Lower Frequency .....	8
3.3.2.	Scan Upper Frequency .....	8
3.3.3.	DVB-S Maximum Baudrate .....	8
3.3.4.	DVB-S Minimum Baudrate .....	8
3.3.5.	DVB-S2 Maximum Baudrate .....	8
3.3.6.	DVB-S2 Minimum Baudrate .....	8
<b>4.</b>	<b>References.....</b>	<b>8</b>

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## Document History

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## 1. Introduction

This document describes registers in Imagination Technologies' UCCP Satellite Fast Scan IP, which is intended for use in conjunction with Imagination Technologies' TV demodulator IP. The purpose of the Satellite Fast Scan IP is to provide a convenient means of detecting valid Satellite broadcast channels in a spectrum quadrant.

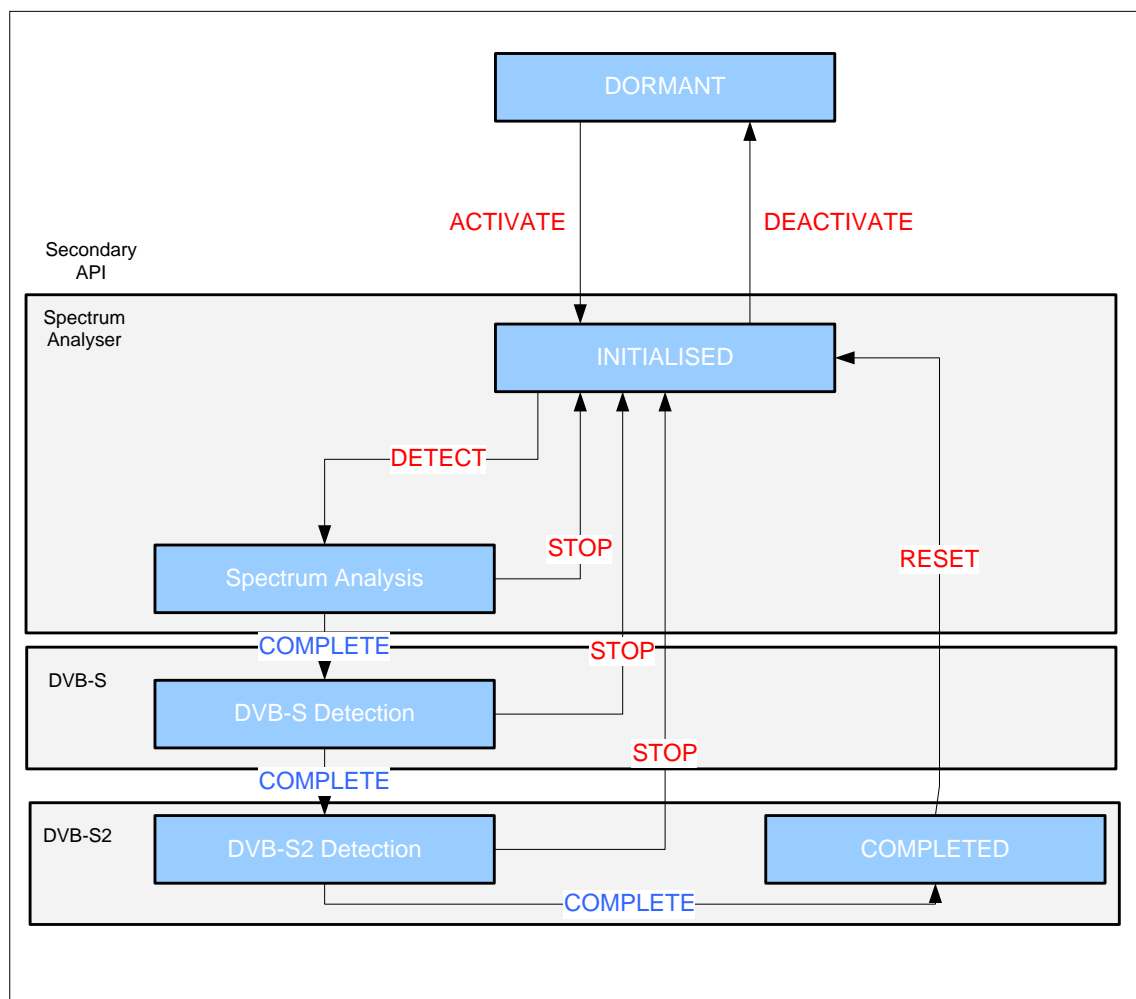
The Satellite Fast Scan IP utilises Imagination Technologies Spectrum Analyser IP and Satellite Demodulator IP. It provides an application that loads and manages these IP modules as necessary.

The virtual register interfaces to these IP modules can be accessed when they are active during the scan process, and the active IP module is identified in the register interface of the Fast Scan IP. These interfaces operate as specified in the relevant register description documents. These interfaces shall be referred to as the secondary API in this document. It is expected that these will be used to configure the scan and to read relevant information about discovered channels. Section 0 provides an example of how the API should be used.

## 2. System Operation

Please refer to reference [1] sections 1 and 2 for a general description of the virtual register system and command register operation.

The Satellite Fast Scan IP uses a behavioural model illustrated in Figure 1:



**Figure 1: Satellite Channel Scan Behavioural Model**

The transitions in the state machine are driven by two external *commands* (generated by the controlling application) and one internally generated *event*. The behaviour of the system is further controlled by values written to control registers associated with the Spectrum Analyser IP. The full set of control registers is described in section 3.

In each detection state, the specified secondary API will be active with registers located as specified in the relevant API documentation (see references [2], [3] and [4]). Although it is possible to write to these registers it is recommended that they should be treated as read only, except at initialisation time as specified in this document. Writing to secondary API registers during the scanning process may result in unexplained behaviour.

When a valid Satellite channel is found, the Fast Scan will pause while demodulating the channel, indicating that it is doing this through the `FS_REG_STATE` register. It will remain in this state until a `FS_CMD_CONTINUE` signal is received in the `FS_REG_CONTROL` register.

## 2.1. Basic Operating Sequence

To perform a channel scan, the sequence of operations is as follows:

1. Controller activates an instance of the Satellite Fast Scan. The UCCP software returns an instance identifier, which is subsequently used to identify the particular fast scan target. The

activation operation corresponds to the state transition from *DORMANT* to *INITIALISED*. At this point, the virtual register interface is operational. The active secondary API is the Imagination Technologies Spectrum Analyser IP.

2. Controller sets up the scan parameters using the API registers. This must include setting the front end and tuner configuration in the Spectrum Analyser secondary API.
3. Controller writes `FS_CMD_DETECT` to the `FS_REG_CONTROL` register, causing the spectrum analyser to initially enter the *DETECTING* state. This starts the scan process.
4. When a valid channel is found, the `FS_REG_STATE` register will indicate `FS_STATE_DEMODULATING`. The system will pause to demodulate the found channel until `FS_CMD_CONTINUE` is received. Valid transport stream data will be output and information about the channel can be found in the API registers of the relevant standard.
5. When `FS_REG_STATE` indicates `FS_STATE_COMPLETE`, the scan is complete.
6. The system can be stopped by the controller writing `TV_CMD_STOP` to the `FS_REG_CONTROL` register. This shall cause a return to the *INITIALISED* state.
7. Once the system returns to the *INITIALISED* state, Fast Scan can be deactivated, which releases resources for use by TV demodulators etc.

## 2.2. API Terminology

Commands	
ACTIVATE	Prepare for use, allocate memory, resources etc.
DEACTIVATE	Remove from active system, Release resources.
DETECT	Run a scan
STOP	Return to <i>INITIALISED</i> state.
CONTINUE	If the system is demodulating a valid satellite channel, stop and attempt to find the next candidate channel.
States	
DORMANT	Standard not available for use. No resources have been allocated. Virtual register API not available
INITIALISED	Resources allocated successfully, The virtual register interface is available.
COMPLETED	Scan results available
Events	
COMPLETE	Scan completed

## 3. Register Set

### 3.1. Identification Registers

#### 3.1.1. Fast Scan API Version

Address: `FS_REG_API_VERSION` (0x4000)  
Access: Read only

Bit(s)	Symbol	Description
31:16	Reserved	

15:8	FS_API_ID_MAJOR	API version ID, major part
7:0	FS_API_ID_MINOR	API version ID, minor part

### 3.1.2. Fast Scan Firmware Version

Address: FS\_REG\_VERSION (0x4001)

Access: Read only

Bit(s)	Symbol	Description
31:16	Reserved	
15:8	FS_VERSION_MAJOR	Fast Scan version ID, major part
7:0	FS_VERSION_MINOR	Fast Scan version ID, minor part

### 3.1.3. Fast Scan Build ID

Address: FS\_BUILD\_ID (0x4002)

Access: Read only

Bit(s)	Symbol	Description
31:0	FS_BUILD_ID	A unique identifier for a particular build of the firmware

## 3.2. Basic System Control

### 3.2.1. System Control

Address: FS\_REG\_CONTROL (0x4003)

Access: Read/write

Initial Value: 0xFFFFFFFF

The control register is the primary operating control for the Fast Scan IP. Command values written to this register control the major operating modes of the demodulator.

This register is a command register as described in [1].

Symbol	Value	Description
FS_CMD_NULL	0	Null command – this command has no effect.
FS_CMD_STOP	1	Stop command – operations stop and the system returns to the “Initialised” state.
FS_CMD_DETECT	2	Detect command – the system enters the <i>DETECTING</i> state and starts a scan.
FS_CMD_CONTINUE	3	When a valid channel is being demodulated, this command will force the system to stop and search for the next valid channel.

### 3.2.2. System State

Address: FS\_REG\_STATE (0x4004)

Access: Write

Initial Value: 0

The state register indicates the current operating state of the Fast Scan system.

In all states, the active secondary API can be identified through the `FS_ACTIVE_SECONDARY_API` register.

Symbol	Value	Description
<code>FS_STATE_DORMANT</code>	0	The <i>DORMANT</i> state is a pseudo-state, representing a system that is not available for use. This value does not normally appear in the state register since the register itself is not valid for a system in the <i>DORMANT</i> state.
<code>FS_STATE_INITIALISED</code>	1	Fast Scan is in the <i>INITIALISED</i> state – it is idle but ready for use.
<code>FS_STATE_SPECTRUM_ANALYSIS</code>	2	Fast Scan is carrying out spectrum analysis. The active secondary API is the Spectrum Analyser.
<code>FS_STATE_SCANNING</code>	3	Fast Scan is carrying out a directed scan on identified channel candidates.
<code>FS_STATE_DEMODULATING</code>	4	Fast Scan is demodulating a valid Satellite Channel. The channel modulation standard can be found by inspecting the <code>FS_ACTIVE_SECONDARY_API</code> register.
<code>FS_STATE_COMPLETE</code>	5	Fast Scan is complete.

### 3.2.3. Scan Progress

Address: `FS_SCAN_PROGRESS` (0x4005)

Access: Read

Initial Value: 0

Bit(s)	Symbol	Description
31:16	<code>FS_COMPLETION_PERCENTAGE</code>	Approximate indication of the completion percentage of the complete scan process.
15:0	<code>FS_CHANNELS_FOUND</code>	The number of valid satellite channels discovered by the scan so far.

### 3.2.4. Active Secondary API

Address: `FS_ACTIVE_SECONDARY_API` (0x4006)

Access: Read

Initial Value: 0

The state register indicates the current secondary API that is active. This is either a Satellite demodulator or the spectrum analyser.

In all states, the active secondary API can be identified through the `FS_ACTIVE_SECONDARY_API` register.

Symbol	Value	Description
<code>SPECTRUM_ANALYSER</code>	0	Spectrum Analyser is loaded.
<code>UCC_STANDARD_DVBS</code>	13	DVB-S demodulator is loaded.
<code>UCC_STANDARD_DVBS2</code>	14	DVB-S2 demodulator is loaded.

## 3.3. Scan Parameters

All of the register values in this section should be set up prior to running a scan, in the *INITIALISED* state.

### 3.3.1. Scan Lower Frequency

Address: FS\_SCAN\_LOWER\_FREQUENCY (0x4007)  
Access: Read/write  
Initial Value: 0x00000000

Bit(s)	Symbol	Description
31:0	FS_SCAN_LOWER_FREQUENCY	The lower frequency limit of the scan, in Hz.

### 3.3.2. Scan Upper Frequency

Address: FS\_SCAN\_UPPER\_FREQUENCY (0x4008)  
Access: Read/write  
Initial Value: 0x00000000

Bit(s)	Symbol	Description
31:0	FS_SCAN_UPPER_FREQUENCY	The upper frequency limit of the scan, in Hz.

### 3.3.3. DVB-S Maximum Baudrate

Address: FS\_DVBS\_MAX\_BAUDRATE (0x4009)  
Access: Read/write  
Initial Value: 0x00000000

Bit(s)	Symbol	Description
31:0	FS_DVBS_MAX_BAUDRATE	The maximum Baudrate DVB-S channel to search for.

### 3.3.4. DVB-S Minimum Baudrate

Address: FS\_DVBS\_MIN\_BAUDRATE (0x400A)  
Access: Read/write  
Initial Value: 0x00000000

Bit(s)	Symbol	Description
31:0	FS_DVBS_MIN_BAUDRATE	The minimum Baudrate DVB-S channel to search for.

### 3.3.5. DVB-S2 Maximum Baudrate

Address: FS\_DVBS2\_MAX\_BAUDRATE (0x400B)  
Access: Read/write  
Initial Value: 0x00000000

Bit(s)	Symbol	Description
31:0	FS_DVB2S_MAX_BAUDRATE	The maximum Baudrate DVB-S2 channel to search for.

### 3.3.6. DVB-S2 Minimum Baudrate

Address: FS\_DVBS2\_MIN\_BAUDRATE (0x400C)  
Access: Read/write  
Initial Value: 0x00000000

Bit(s)	Symbol	Description
31:0	FS_DVBS2_MIN_BAUDRATE	The minimum Baudrate DVB-S2 channel to search for.

## 4. References



- [1] Imagination Technologies "UCCP Common TV API Virtual Register Interface"
- [2] Imagination Technologies "Spectrum Analyser Register Description Document"
- [3] Imagination Technologies "DVB-S Register Description Document"
- [4] Imagination Technologies "DVB-S Register Description Document"