Mass Software Upgrade (MSU)

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Roles	Function	Name
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1. SCOPE

The Scope of this IDD Document is to define the data structures that will be exchanged between MSU Server and MSU Client.

The MSU Server implements the message data structures as C# Classes under the .Net framework 4.0 and will be defined in an assembly – "*MSUServer.MSUMessageFrames.dll*".

1.1. References

Index	Document Title	Document ID	Version
1	MSU Offer Requirements		V 01.0
2	MSU Protocol Specification		V 01.0

2. MSU SERVER MESSAGES

***Assembly*:** MSUServer.MSUMessageFrames (in MSUServer.MSUMessageFrames.dll) Version: 1.0.0.0

2.1. MSU Server Transmit Message Classes

2.1.1. MSUWhoIs Class

Namespace: MSUServer.MSUMessageFrames.MSUTransmitFrames

➢ **Properties**

	Name	Type	Description
	Command	byte	Property which holds the MSU Command Message. - Opcode : MSU Device Discover (4 bits) - Subcode : Who Is (4 bits)
	EndRange	uint[10]	Scan Option's End Range of Device's ID (IP Address in Network Order)
	IsRange	byte	Property which holds, whether the Scan to be performed on Range option or Device ID option. - If TRUE, the Start Range and End Range should be provided. If FALSE, Start Range is interpreted as the Device ID and the End Range is filled with zeros/null character.
	Msgtype	byte	MessageType property for future usage.
	StartRange	uint[10]	Scan Option's Start Range of Device's ID (IP Address in Network Order)
	VersionInfo	byte	Property which holds the MSU Protocol Version and IP Version. - IP Version : IPV4 (0), IPV6 (1) (1 bit) - Protocol Version – set to 2 (3 bits) - Reserved bits (4 bits)

2.1.2. MSUConnectRequest Class

Namespace: MSUServer.MSUMessageFrames.MSUTransmitFrames

➢ **Properties**

	Name	Type	Description
	Command	byte	Property which holds the MSU Command Message. - Opcode : MSU Device Discover (4 bits) - Subcode : Who Is (4 bits)
	FileNameLength	byte	
	FirmwareVerLength	byte	
	HardwareIDLength	Byte	
	ModelNameLength	byte	
	MsgType	byte	Reserved property for future usage.
	PasswordLength	byte	
	ProductIDLength	byte	
	ProductNameLength	byte	
	Reserved1	byte	Reserved property for future usage.
	ServerIP	uint[10]	Server's IP address
	ServerMacID	byte[6]	Server's Physical Address

	Name	Type	Description
📝	SoftwareVerLength	`byte`	
📝	TransactionID	`uint`	randomly generated transaction ID (Encrypted)
📝	UsernameLength	`byte`	
📝	VarLengthData	`byte[100]`	
📝	VendorIDLength	`byte`	
📝	VersionInfo	`byte`	Property which holds the MSU Protocol Version and IP Version. - IP Version : IPV4 (0), IPV6 (1) (1 bit) - Protocol Version – set to 2 (3 bits) - Reserved bits (4 bits)

2.1.3. MSUDisconnectCommand Class

Namespace: MSUServer.MSUMessageFrames.MSUTransmitFrames

➢ **Properties**

	Name	Type	Description
📝	Command	`byte`	Property which holds the MSU Command Message. - Opcode : MSU Device Discover (4 bits) - Subcode : Who Is (4 bits)
📝	MsgType	`byte`	MsgType property
📝	Reserved	`byte`	Reserved property for future usage.
📝	ServerIP	`uint[10]`	Server's IP address
📝	TransactionID	`uint`	randomly generated transaction ID (Encrypted)

| | VersionInfo | byte | Property which holds the MSU Protocol Version and IP Version. - IP Version : IPV4 (0), IPV6 (1) (1 bit) - Protocol Version – set to 2 (3 bits) - Reserved bits (4 bits) |

2.1.4. MSUNotificationMessage Class

Namespace: MSUServer.MSUMessageFrames.MSUTransmitFrames

➢ **Properties**

	Name	Type	Description
	CMMulticastAddress	uint[10]	The client systems which are interested in participating in the CM either in SCM or CCM need to join this multicast address.
	CMPortNumber	ushort	The client systems which are interested in participating in the CM either in SCM or CCM need to listen on this port to receive CM multicast messages.
	Command	byte	Property which holds the MSU Command Message. - Opcode : MSU Device Discover (4 bits) - Subcode : Who Is (4 bits)
	DestPathLength	byte	Length of the destination path of the file under transfer.
	FileCRC	uint	32-bit CRC of the file being transferred.
	FileNameLength	byte	Length of the file name being transferred.
	FileNumber	ushort	In case of upgrade process involving multiple files, this number represents the index of the file that is being transferred. This number starts from 1.

	FileSize	uint	Size of the file in bytes that is being transferred.
	GroupID	byte	The T/F bit suggests whether the GroupID is valid or not. If valid, then this can be any number from 1 to 128 (7-bit). GroupID 0 is the default group.
	MulticastAddress	uint[10]	The client systems that are interested in participating in the MSU process need to join this multicast address.
	NumberOfChunks	uint	Total number of chunks in the current file transfer.
	PortNumber	ushort	The client systems that are interested in participating in the MSU process need to listen on this port to receive multicast messages.
	SequenceNumLimit	ushort	Maximum number of sequences in the first chunk up to the last but one chunk. Note that the last chunk may have a smaller number of sequences depending on the file size. This limit should not be more than 32.
	SequenceSizeLimit	ushort	Maximum size in bytes of the data payload of a single packet sequence. Note that the last sequence of the last chunk may have a smaller size depending on the file size.
	TransactionID	uint	Randomly generated number which uniquely represents one MSU cycle (Encrypted)
	UpdateTimeout	byte	On Communication failure for a period greater than this timeout value, the Client MUST exit from the current process and become available for next update cycle without participating for the rest of the current update process. The status of the client will remain 'FAIL' until the beginning of the next update cycle.

		byte[100]	String of variable length, the length is specified by the previous field.
	VarLengthData	byte[100]	String of variable length, the length is specified by the previous field.
	VersionInfo	byte	Property which holds the MSU Protocol Version and IP Version. - IP Version : IPV4 (0), IPV6 (1) (1 bit) - Protocol Version – set to 2 (3 bits) - Reserved bits (4 bits)

2.1.5. MSUDataTransferMessage Class

Namespace: MSUServer.MSUMessageFrames.MSUTransmitFrames

➢ **Properties**

	Name	Type	Description
	ChunkNumber	uint	Chunk in the current file being transferred.
	Command	byte	Property which holds the MSU Command Message. - Opcode : MSU Device Discover (4 bits) - Subcode : Who Is (4 bits)
	DataLength	ushort	Sequence data size in bytes.
	FileNumber	ushort	In case of upgrade process involving multiple files, this number represents the index of the file that is being transferred. This number starts from 1.
	FileTransaferState	byte	File/Chunk Transfer state: (2 bits) FILE_START [0]/END[1] – BIT 0 CHUNK_START [0]/END [1] – BIT 1
	SequenceNumber	byte	Sequence in the current Chunk being transferred.
	VarLengthData	byte[100]	String of variable length, the length is specified by the *DataLength* field.

📄 VersionInfo	byte	Property which holds the MSU Protocol Version and IP Version. - IP Version : IPV4 (0), IPV6 (1) (1 bit) - Protocol Version – set to 2 (3 bits) - Reserved bits (4 bits)

2.1.6. MSUSCMCompletedMessage Class

Namespace: MSUServer.MSUMessageFrames.MSUTransmitFrames

➢ **Properties**

	Name	Type	Description
📄	Command	byte	Property which holds the MSU Command Message. - Opcode : MSU Device Discover (4 bits) - Subcode : Who Is (4 bits)
📄	FileNumber	ushort	In case of upgrade process involving multiple files, this number represents the index of the file that is being transferred. This number starts from 1.
📄	Reserved	byte[3]	Reserved 3 bytes for future usage.
📄	SCMRetryFalg	byte	SCM Retry Flag.
📄	VersionInfo	byte	Property which holds the MSU Protocol Version and IP Version. - IP Version : IPV4 (0), IPV6 (1) (1 bit) - Protocol Version – set to 2 (3 bits) - Reserved bits (4 bits)

2.1.7. MSUCCMCompletedMessage Class

Namespace: MSUServer.MSUMessageFrames.MSUTransmitFrames

➢ **Properties**

	Name	Type	Description
	CCMRetryFalg	byte	CCM Retry Flag.
	Command	byte	Property which holds the MSU Command Message. - Opcode : MSU Device Discover (4 bits) - Subcode : Who Is (4 bits)
	FileNumber	ushort	In case of upgrade process involving multiple files, this number represents the index of the file that is being transferred. This number starts from 1.
	Reserved	byte[3]	Reserved 3 bytes for future usage.
	VersionInfo	byte	Property which holds the MSU Protocol Version and IP Version. - IP Version : IPV4 (0), IPV6 (1) (1 bit) - Protocol Version – set to 2 (3 bits) - Reserved bits (4 bits)

2.1.8. MSUTransferCompletedMessage Class

Namespace: MSUServer.MSUMessageFrames.MSUTransmitFrames

➢ **Properties**

	Name	Type	Description
	Command	byte	Property which holds the MSU Command Message. - Opcode : MSU Device Discover (4 bits) - Subcode : Who Is (4 bits)
	FileNumber	ushort	In case of upgrade process involving multiple files, this number represents the index of the file that is being transferred. This number starts from 1.

🖼️	VersionInfo	byte	Property which holds the MSU Protocol Version and IP Version. - IP Version : IPV4 (0), IPV6 (1) (1 bit) - Protocol Version – set to 2 (3 bits) - Reserved bits (4 bits)

2.1.9. *MSUTransferAbortedMessage Class*

Namespace: MSUServer.MSUMessageFrames.MSUTransmitFrames

➢ **Properties**

	Name	Type	Description
🖼️	Command	byte	Property which holds the MSU Command Message. - Opcode : MSU Device Discover (4 bits) - Subcode : Who Is (4 bits)
🖼️	FileNumber	ushort	In case of upgrade process involving multiple files, this number represents the index of the file that is being transferred. This number starts from 1.
🖼️	VersionInfo	byte	Property which holds the MSU Protocol Version and IP Version. - IP Version : IPV4 (0), IPV6 (1) (1 bit) - Protocol Version – set to 2 (3 bits) - Reserved bits (4 bits)

2.1.10. *MSUTransmitStatusRequest Class*

Namespace: MSUServer.MSUMessageFrames.MSUTransmitFrames

➢ **Properties**

	Name	Type	Description
🖼️	CcmRetry	byte	Property represents how many times CCM was tried.
🖼️	Command	byte	Property which holds the MSU Command Message. - Opcode : MSU Device Update (4 bits) - Subcode : Client Status Update Request (4 bits)

📄	DeviceId	`uint`	Device IP Address in host to network format for which the transaction status request is being sent.
📄	ErrorCode	`byte`	Error Code in case of File Transmit Failure.
📄	Reserved	`byte[3]`	Reserved 3 bytes for future usage.
📄	Status	`byte`	File Transmit Status - Success/Failure
📄	TransactionId	`uint`	Randomly generated number which uniquely represents one MSU cycle (Encrypted)
📄	VersionInfo	`byte`	Property which holds the MSU Protocol Version and IP Version. - IP Version : IPV4 (0), IPV6 (1) (1 bit) - Protocol Version – set to 2 (3 bits) - Reserved bits (4 bits)

2.2. MSU Server Receive Message Classes

2.2.1. MSUIam Class

Namespace: MSUServer.MSUMessageFrames.MSURecieveFrames

➢ **Properties**

	Name	Type	Description
	AuthenticationReq	byte	
	Command	byte	
	DeviceID	uint[10]	
	DevLocLength	byte	
	DevMSUParamLength	byte	
	GroupID	byte	
	HardwareIDLength	byte	
	MajMinRevLength	byte	
	ModelNameLength	byte	
	ProductIDLength	byte	
	ProductNameLength	byte	
	ReservedUserSpc	byte[3]	

	SWVersionLength	byte
	VarLengthData	byte[100]
	VendorIDLength	byte
	VersionInfo	byte

2.2.2. MSUConnectResponse Class

Namespace: MSUServer.MSUMessageFrames.MSURecieveFrames

➤ **Properties**

	Name	Type	Description
	Command	byte	
	ErrorCode	byte	
	ErrorSubCode	byte	
	UserData	uint	
	VersionInfo	byte	

2.2.3. MSUDisconnectResponse Class

Namespace: MSUServer.MSUMessageFrames.MSURecieveFrames

➢ **Properties**

	Name	Type	Description
	Command	byte	
	ErrorCode	byte	
	ErrorSubCode	byte	
	UserData	uint	
	VersionInfo	byte	

2.2.4. MSUSCMMessage Class

Namespace: MSUServer.MSUMessageFrames.MSURecieveFrames

➢ **Properties**

	Name	Type	Description
	ChunkNumber	uint	Refers to the number of the chunk to which this SCM belongs.
	Command	byte	Property which holds the MSU Command Message. - Opcode : MSU Device Discover (4 bits) - Subcode : Who Is (4 bits)
	FileNumber	ushort	Refers to the number of the file to which this CCM belongs.

	NumOfSequencesMissed	byte	The total number of missed frames.
	Reserved	byte[3]	Reserved 3 bytes for future Usage.
	SequenceBitMap	uint	The missed sequence numbers are represented by bits. The 0th bit indicates SN=1 and so on
	VersionInfo	byte	Property which holds the MSU Protocol Version and IP Version. - IP Version : IPV4 (0), IPV6 (1) (1 bit) - Protocol Version – set to 2 (3 bits) - Reserved bits (4 bits)

2.2.5. MSUCCMMessage Class
Namespace: MSUServer.MSUMessageFrames.MSURecieveFrames

➢ **Properties**

	Name	Type	Description
	Command	byte	Property which holds the MSU Command Message. - Opcode : MSU Device Discover (4 bits) - Subcode : Who Is (4 bits)
	FileNumber	ushort	Refers to the number of the file to which this CCM belongs.
	MissedChunkNumber	uint[100]	Refers to the missed chunk number that the client wants the server to re-transmit. Each chunk number takes four bytes in the message format stacked one below the other as indicated by Variable Length CNs.
	NumOfChunksMissed	uint	This is the number of missed/malformed chunks.
	VersionInfo	byte	Property which holds the MSU Protocol Version and IP Version. - IP Version : IPV4 (0), IPV6 (1) (1 bit) -

Protocol Version – set to 2 (3 bits) - Reserved bits (4 bits)

2.2.6. MSUStatusMessage Class

Namespace: MSUServer.MSUMessageFrames.MSURecieveFrames

➢ **Properties**

	Name	Type	Description
	CCMRetry	byte	CCM Retry - Number of times the client had participated in CCM process.
	Command	byte	Property which holds the MSU Command Message. - Opcode : MSU Device Discover (4 bits) - Subcode : Who Is (4 bits)
	DeviceID	uint	Device Identification - device which sent the status
	ErrorCode	byte	Failure code (0 if there is no failure)
	Reserved	byte[3]	Reserved 3 bytes for future usage.
	Status	byte	PASS (0) FAIL (1) IN_PROGRESS (3)
	TransactionID	uint	transaction ID (Encrypted) - The latest TransactionID stored by the client for the current MSU cycle.
	VersionInfo	byte	Property which holds the MSU Protocol Version and IP Version. - IP Version : IPV4 (0), IPV6 (1) (1 bit) - Protocol Version – set to 2 (3 bits) - Reserved bits (4 bits)

2.2.7. MSUTransmitStatusResponse Class

Namespace: MSUServer.MSUMessageFrames.MSURecieveFrames

➢ Properties

	Name	Type	Description
📑	CcmRetry	byte	Property represents how many times CCM was tried.
📑	Command	byte	
📑	DeviceId	uint	Device IP Address in host to network format for which the transaction status request is being sent.
📑	ErrorCode	byte	Error Code in case of File Transmit Failure.
📑	Reserved	byte[3]	Reserved 3 bytes for future usage.
📑	Status	byte	File Transmit Status - Success/Failure
📑	TransactionId	uint	Randomly generated number which uniquely represents one MSU cycle (Encrypted)
📑	VersionInfo	byte	Property which holds the MSU Protocol Version and IP Version. - IP Version : IPV4 (0), IPV6 (1) (1 bit) - Protocol Version – set to 2 (3 bits) - Reserved bits (4 bits)

3. Notes

3.1. Glossary

To be updated

3.2. Acronyms and Abbreviations

To be updated