VISION REMOTE

Technical Specification

Vision Link Configuration Files

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1	2018-01-26	First revision	JanL	OTE	OTE
2	2018-09-17	Updated during implementation	OTH	GAØ	OTE
3	2019-12-06	Implemented bitfield support and added boolean datatype	OTH	JL	GAØ
4	2020-11-30	Added list of application tags	MHS	KT	MHS

Table of Contents

1   Introduction

1.1   Purpose

This document contains information on how to setup and use the configurations files in Vision Link.

1.2   Definitions and Abbreviations

Refer to document QP-0005 Definitions and Abbreviations

1.3   References

TS-0006 VM-110 UDP EG-Link Specification

TS-0007 VM-110 EC-Link Specification

1.4 Revision History

Revision	Description
1	First revision
2	Added RU configuration code for APEM 3000 joystick with cross guide. Added BU configuration parameter for multicast IP address and port. Added GFBM.
3	Added support for using bitfields in EC/EG link. Added boolean data type.

2 Introduction

The VisionLink software is highly parameterized, and the system integrator can change the behaviour of the software by altering a set of configuration files. The configuration parameters are stored in .csv files that can be opened and edited in spreadsheet applications like Microsoft Excel.

This document describes the different configuration files and all parameters in these files.

3 Configuration file content requirements

All configuration files must include minimum 2 rows. The first row will contain the column key arrangement, and the second row will contain the GUI Label for that column. The following rows will contain the configuration data.

The first column in every configuration file must contain a Vision Link tag key. The first column will be referred as "tag key" in the rest of the document. "tag key" is the same as the column key "tag" in this document.

The different configuration files will have different required columns, but the developer can add as many custom columns as it wants to any configuration file. Custom columns can be accessed from the API using the column keys.

tag	Label	customColumnKey
Tag	GUI Label	Custom Column
customTag	Custom Tag	Custom Column Value

3.1 Naming conventions

Semicolon (;) shall not be used in any content anywhere in the configuration file. Semicolon inside the content will break the parsing of the file and can result in unexpected behaviour.

3.2   Column keys and tags

All keys and tags shall use lowercase letters and each word shall be separated with "camelCase". The first character in a key or tag should be a lowercase letter.

Only letters, numbers, and underscore (a-z, A-Z, 0-9 and _) can be used in a key or tag.

4   BU configuration files

All configuration files are located in the folder /home/root/Applications/visionlinkserver/config. The following files are located here:

File name	Description
app.csv	Contains application specific configuration parameters. See section 4.1
remotes.csv	Specifies all remote units that can communicate with this BU.
ECOutputTags.csv	Specifies layout of periodic output data received on fieldbus (EC Link, Profibus or ProfiNet) and assigns tag names that is used by the RU application to fetch this data.
EGOutputTags.csv	Specifies layout of periodic output data received on UDP messages on EG-link and assigns tag names that is used by the RU application to fetch this data.

4.1   File app.csv

This file contains VisionLink application configuration parameters. Content is like this:

Tag	label	value	type
Tag	GUI Label	Value	Data type
BGSR	BG VisionLink Server SW revision	0	UINT32
TIME	Time	0	UINT32
FMAP	Fieldbus data layout map	1	UINT32
FADR	Fieldbus address	10	UINT32
FSPD	Fieldbus speed in bit per second	0	UINT32
EGDH	EG-Link IP address.	0	UINT32
CCH1	C-Link radio channel 1	434100	UINT32
CCH2	C-Link radio channel 2	0	UINT32
CCH3	C-Link radio channel 3	0	UINT32
EMAP	EG-link data layout map	6	STRING
MCIP	EG-Link multicast IP	239.255.42.20	STRING
MCPT	EG-Link multicast port out	5825	STRING
MTTL	EG-Link multicast ttl	1	UINT32
DHCP	EG-Link address assigned by DHCP	0	UINT32
NTPE	Enable local NTP server	0	UINT32
NTPA	NTP peer to sync with		STRING
SID1	SSID of the VLAPS connected	VRGL4012	STRING
WPA1	WPA password of VLAPS	theSecretPassword	STRING

Only modify the "value" column in this file. Most of the values are only used internally. Changing these will have no effect. The values that are used to control the system are:

FMAP	Fieldbus map. Controls the data exchanged on EC-Link. See TS-0007 and description below.
FADR	Fieldbus address. This is Profibus node address if your system is configured with Profibus.
CCH1..CCH3	Radio frequencies used for C-Link radio in kHz. Unused entries shall be set to 0. Must match the same parameters in app.csv in RU to enable operation on radio.
EMAP	EG-Link map. Controls the data exchanged on EG-Link. See TS-0006 and description below.
MCIP	EG-Link multicast IP address. See TS-0006.
MCPT	EG-Link multicast port for messages sent from BU. Receive port is always 2 higher.

When multiple frequencies are specified, the system automatically selects the best one. It is recommended to specify at least two frequencies, especially if there are more than one VLAP and more than one paired RU.

The FMAP parameter is a bitmask where bit 0 controls periodic input, bit 1 controls commands and bit 2 controls periodic output. Commonly used values are:

0	Fieldbus disabled. Use this value if your system is not equipped with a fieldbus module or if the fieldbus shall not be used.
1	Selects operational mode "Input Only" specified in TS-0007.
3	Selects operational mode "Input + Commands" specified in TS-0007.
7	Selects operational mode "Standard" specified in TS-0007.

The EMAP parameter is a bitmask where bit 0 controls periodic input, bit 1 controls commands and bit 2 controls periodic output.

4.2   File Remotes.csv

This file specifies the RUs that are paired with this BU (RUs that that can connect with this BU). Content is like this:

ruindex	RUID	PKY1	PKY2	PKY3	PKY4
Index of RU	Remote id	Pky 1	Pky 2	Pky 3	Pky 4
0	1013	0	0	0	0
1	1014	0	0	0	0

This file specifies that the RUs with ID 1013 and 1014 is paired with this BU.

This file must specify at least 1 RU and can specify up to 200 RUs.

Description of the different columns:

ruindex	Index of the RU. Set to 0 for the first RU and increment with 1 for all following RUs.
RUID	Unique HW-ID of the RU. The HW-ID of an RU can be found by using the service app.
PKY1..PKY4	Pairing key 1 to 4. Must match the same parameters in app.csv in RU to enable operation.

4.3 File ECOutputTags.csv

This file specifies all output data elements that is received on EC-Link that shall be used by the application in RU. Each element is given a tag name that is used by the RU application to retrieve this element. Use the template file and modify it, as necessary.

The columns in this file can be divided into the following groups:

- Columns used to read data. Some of these are required to read the data. See 4.3.1.
- Columns used in user interface components. These columns are optional and will be used by the standard VisionLink GUI components to scale and format the data. See 4.3.2.

4.3.1 Columns needed to read data

These columns are:

tag	startByte	byteSize	startBit	bitSize	dataType	priority
Tag	Start Byte	Byte Size	Start Bit	Bit Size	Data Type	Priority
oilTemp	0	2			INT	
tension	2	4			REAL	

Description of the different columns:

Tag	Tag name used to fetch the data from RU application using VisionLink API.
startByte	Offset in EC link data for the first byte to fetch.
byteSize	Size of data to fetch in number of bytes.
startBit	Bit number of first bit to fetch (within first byte). Only used if the data to fetch is not a complete number of bytes.
bitSize	Number of bits to fetch. Only used if the data to fetch is not a complete number of bytes.
dataType	Type of data to fetch. See overview below of all supported data types below.
priority	May be set to a value in range 1 to 3. A lower value means that data will be prioritized when G-Link WiFi is not available. Not implemented yet.

The following combinations of data types and byte size are supported:

Datatype	byteSize	Description
UINT	1, 2 or 4	Unsigned little-endian integer value with size 8, 16 or 32 bits. startBit and bitSize may be used to read a smaller amount, down to 1 bit.
INT	1,2 or 4	Signed little endian integer value with size 8, 16 or 32 bits. startBit and bitSize may be used to read a smaller amount.
REAL	4 or 8	IEEE754 little-endian floating-point value with size 32 or 64 bits.
BE_UINT	1, 2 or 4	Unsigned big-endian value with size 8, 16 or 32 bits. startBit and bitSize may be used to read a smaller amount, down to 1 bit.
BE_INT	1, 2 or 4	Signed big endian integer value with size 8, 16 or 32 bits. startBit and bitSize

		may be used to read a smaller amount.
BE_REAL	4 or 8	IEEE754 big-endian floating-point value with size 32 or 64 bits.
STRING	1 to 65534	Readable ASCII string.
RAW	1 to 65534	Raw/unprocessed data. It is up to the RU application to interpret this data.
BOOLEAN	1, 2 or 4	The value of a single bit expressed as a boolean value. When multibyte values this is little endian. Use startBit to specify the bit that this tag shall represent.
BE_BOOLEAN	1, 2 or 4	The value of a single bit expressed as a boolean value. When multibyte values this is big endian. Use startBit to specify the bit that this tag shall represent.

4.3.2   Columns used in user interface components

These columns are:

Label	minValue	maxValue	minWarningValue	maxWarningValue
GUI label	Minimum value	Maximum Value	Minumum Warning Value	Maximum Warning Value
Oil Temp	-40	200	10	120
Tension	0	60		40.0

minAlarmValue	maxAlarmValue	unitLabel	relatedTags
Minimum Alarm Value	Maximum Alarm Value	Unit Label	Related Tags
-10	150	C	*Not implemented*
	50.0	T	*Not implemented*

Description of the different columns:

label	Label shown for the tag in the GUI. Usually next to the value received from the host system. Highly recommended for all tags.
minValue maxValue	Used in the GUI to display the values but also to calculate the graphic and animations for bars, gauges, and other components. Leave empty when not applicable.
minWarningValue maxWarningValu e	If value gets outside these limits the GUI element will indicate this, e.g. with a yellow warning colour. Leave empty if not applicable.
minAlarmValue maxAlarmValue	If value gets outside these limits the GUI element will indicate this, e.g. with a red alarm color. Leave empty if not applicable.
unitLabel	Used in GUI to show the user what kind of unit the value is. E.g. kg, m, degree, etc.
relatedTags	Not implemented.

From the values in example above we see that the two first bytes of EC data are oil temperature in degrees Celsius as a 16-bit signed integer. It is scaled from -40 to 200 when shown. Warning is indicated if it is below 10 or above 120. Alarm is indicated if below -10 or above 150.

In the example byte 2 to 5 is tension in tonnes as a real value. It is scaled from 0 to 60. Warning is indicated when above 40 tonnes and alarm is indicated when above 50 tonnes.

4.4   File EGoutputTags.csv

This file specifies all output data elements that is received on EG-Link that shall be used by the application in RU. File layout is identical to ECOutputTags.csv.

4.5   File manifest.csv

The manifest.csv file is holding info that is necessary for the installation SW. The file is made up of key – value pairs. See template application for an example file.

5   RU configuration files

The file structure on RU is like this:
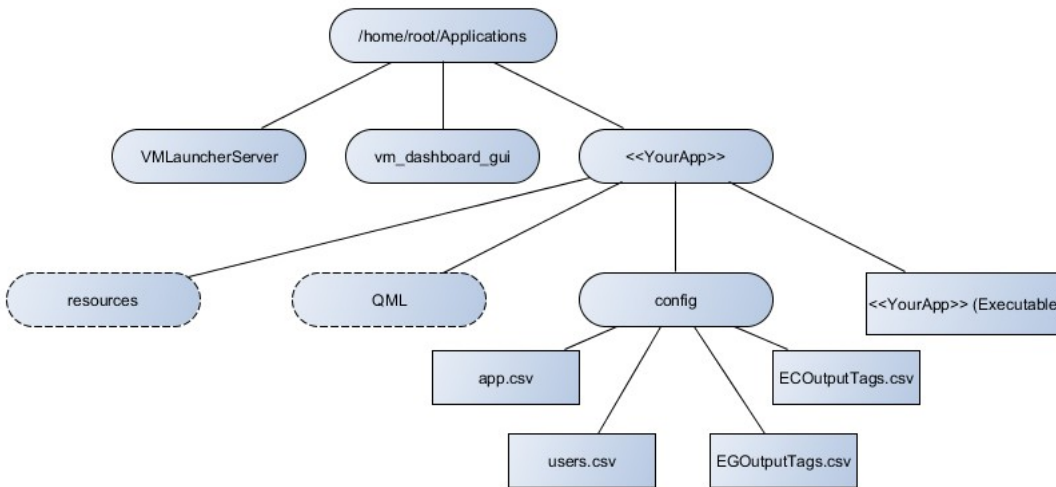
The RU can hold multiple applications, each in a separate folder. Adding a new application is as simple as creating a new folder and adding the necessary files. If the RU shall communicate with multiple BU's each BU is treated as a separate application.

The application must contain an executable file with the same name as the folder, that is made to communicate with the BU and control the machine connected to the BU. How to make this application is beyond the scope of this document.

All configuration files are placed inside a folder named "config".

5.1   File app.csv

This file is required to make the application available to the user on the remote. The file requires the tags listed in the table below.

tag	Label	value
Tag	GUI Label	Value
name	Application name	Port LARS
type	Application type	controlSystem
ip	IP-address	0
APSR	Application version	0
RGSR	Vision Link version	0
BUID	Base unit id	0

RTYP	C-Link radio type	80434
CCH1	C-Link radio channel 1	434100
CCH2	C-Link radio channel 2	0
CCH3	C-Link radio channel 3	0
AJS1	Joystick 1	1190
AJS2	Joystick 2	1190
AJS3	Joystick 3	1190
AJS4	Joystick 4	1190
AEF1	Engineering field 1	101
AEF2	Engineering field 2	2
AEF3	Engineering field 3	2
AEF4	Engineering field 4	101
AEF5	Engineering field 5	0
AEF6	Engineering field 6	0
AEF7	Engineering field 7	0
AEF8	Engineering field 8	0
AENC	Encoder	700
GFBM	Fallback mode	2

Only modify the "value" column in this file. The values are:

Name	Application name shown on user interface.
Type	Application type. Set to one of the following values: - controlSystem : Normal control application communicating with a BU. - service : Application running only on RU, not communicating with a BU.
ip	Not used yet.
APSR	Tag used internally. Value is not used.
RGSR	Tag used internally. Value is not used.
BUID	Tag used internally. Value is not used.
RTYP	Identification code for the C-link radio type expected by the application.
CCH1..CCH3	Radio frequencies used for C-Link radio in kHz. Unused entries shall be set to 0. Must match the same parameters in app.csv in BU to enable operation on radio.
AJS1..AJS4	Identification code for joystick 1 to 4 expected by the application.
AEF1..AEF8	Identification code engineering field position 1 to 8 expected by the application.
AENC	Identification code for encoder type expected by the application.
GFBM	If set to 1 G-Fallback will always be used. Set to 2 for using G-Fallback only when armed (default).

All the identification codes can be set to 0 if the equipment is not used by the application. If the identification code is not 0, the system will check that the RU is equipped with the necessary components before the application is started. The following identification codes are used:

Value	Description	Field
0	Position not used	All
1	Pushbutton or 2-position switch with spring return	AEFx
2	2-position latching switch	AEFx
101	3-position switch spring return	AEFx
102	3-position switch with 1 latching and 1 spring return position	AEFx
202	3-Position latching switch	AEFx
700	Encoder without push function	AENC
701	Encoder with push function.	ANEC
801	Push button with LED	AEFx
808	Dual color LED	AEFx
1099	Potentiometer	AEFx

1190	JC120-0002 single axis joystick with 90% active area and direction switches	AJSx
2099	APEM 3000 dual axis HALL joystick	AJSx
2199	APEM 3000 dual axis HALL joystick with cross guide	AJSx
80434	STD-302S 434 MHz radio	RTYP
80869	STD-302S 869 MHz radio	RTYP

5.2   File users.csv

Holds a list of users that are permitted to use the application. Looks like this:

tag	firstName	lastName	password	color
Tag	First Name	Last Name	Password	Color
ola	Ola	Nordmann	8622	#ff0000
user2	User Without	Password		#00ff00

Description of the different columns:

tag	Short unique name of table entry.
firstName	First name of user presented on user interface.
lastName	Last name of user presented on user interface.
password	Personal password (PIN code) for this user. Keep column empty if no password is required. Not implemented.
color	RGB value of color used to quickly identify the user in the GUI.

5.3   File ECOutputTags.csv
Shall be identical to the ECOutputTags.csv file in BU.

5.4   File EGOutputTags.csv
Shall be identical to the EGOutputTags.csv file in BU.

6   RU application tags
List of tags accessible from application on RU.

Tag	Description	Data type	Byte Size
bu_identity	Base ID Base unit id number	UINT	2
bu_state	Base state have 7 states:	UINT	1
0	Initial. BU is not fully operative yet.		
1	Stopped.BU is armed against a specific RU, and RU signals that BU should stop		
2	External link error. Monitoring has detected an error in EC-Link or EG-Link.		
3	Blocked. Communication is lost with an armed RU. Turn on RU andrearm to resumeoperation		

4	Failed. Self-diagnostics has discovered a fatal internal error in BU		
5	Disarmed. BU is not armed against a specific RU. Check 'Unarmed RUs' to see if any unarmed Rus are connected.		
6	Armed. BU is armed against a specific RU		
vlaps	Number of VLAPs to BU. In range (0 – 3)	UINT	1
unarmed_rus	Unarmed Rus Number of Rus paired to BU in unarmed state.	UINT	1
eglink_stat_out	EG link status reported	UINT	1
0	Not configured. The link is not used in this system.		
1	Operational. The link operates normally		
2	Link error. Link has failed to operate as intended.		
3	Data error. Link is up, but there is an error in the exchanged data.		
4	Passive. Link is not in use. Can only be reported on C-Link when no remote is armed.		
5	This is defined to make it easy to check that the value is valid.		
eclink_status	EC link status, the same 6 states as listed above.	UINT	1
c_link_status	C-Link Status, the same 6 states as listed above.	UINT	1
g_link_status	G-Link Status, the same 6 states as listed above.	UINT	1
armed_ru	ID of armed RU. This tag will hold to RU id in all states even when the RU is blocked this tag will show blocked Ru id.	UINT	2
ru_identity	Remote ID, this id comes from the RU motherboard and is not releated to the number on the back of the remote.	UINT	2
state	State	UINT	1
0	No link between RC and RGP		
1	Waiting, state means no application have been selected.		
2	Selected, application have been selected		
3	Armed enabled, application is armed		
4	Stop, stop button is triggered of stopped due to some other factor		
5	Powering down, Ru is powering down		
6	Exit application, closing application		
7	Arming, attempting to arm Ru		
rc_state	Same states as listed above.	UINT	1
c_link_rssi	C-Link Signal Strength (0 – 100)	UINT	1
cable	Remote Cable Status. 1 if cable is connected else 0.	UINT	1
docked	Docking Status. 1 if docking is connected else 0.	UINT	1
disabled	Disabled Status. 1 if Ru is disabled by tilting else 0.	UINT	1
joystick_01	Value of Joystick 1 (0 – 1000) these tags are reading directly form IO not data being sent	INT	2

joystick_02	Value of Joystick 2 (0 – 1000) these tags are reading directly form IO not data being sent	INT	2
joystick_03	Value of Joystick 3 (0 – 1000) these tags are reading directly form IO not data being sent	INT	2
joystick_04	Value of Joystick 4 (0 – 1000) these tags are reading directly form IO not data being sent	INT	2
switch_01	Value of Switch 1 these tags are reading directly form IO not data being sent	INT	2
switch_02	Value of Switch 2 these tags are reading directly form IO not data being sent	INT	2
switch_03	Value of Switch 3 these tags are reading directly form IO not data being sent	INT	2
switch_04	Value of Switch 4 these tags are reading directly form IO not data being sent	INT	2
switch_05	Value of Switch 5 these tags are reading directly form IO not data being sent	INT	2
switch_06	Value of Switch 6 these tags are reading directly form IO not data being sent	INT	2
switch_07	Value of Switch 7 these tags are reading directly form IO not data being sent	INT	2
switch_08	Value of Switch 8 these tags are reading directly form IO not data being sent	INT	2
encoder_value	Current value of Encoder (0 – 255) these tags are reading directly form IO not data being sent	UINT	1
encoder_switch	Value of Encoder Switch, 1 when pressed down else 0. these tags are reading directly form IO not data being sent	UINT	1
io_error	IO Error 1 when there is an error with any IO else 0.	UINT	1
io_active	IO Active 1 when an IO is active else 0.	UINT	1
roll	Remote Roll degrees Ru is tilted side to side	INT	2
pitch	Remote Pitch degrees Ru is tilted top to bottom.	INT	2
g_link_rssi	G-Link Signal Strength (0 – 100)	UINT	1
g_link_cable	G-Link Cable Status. 1 if cable is connected else 0.	UINT	1
ru_battery	Battery Level % of remaining battery	UINT	1
ru_charge_state	Battery Charge State Shows how many % an hour is being charge currently.	UINT	1
led_control_1_to_8	Engineering Field LEDs. Shows state of led (1 – 8). Return values are :	UINT	1
1	Green		
2	Red		
3	Amber		

101	Green Blinking		
102	Red Blinking		
102	Amber Blinking		
light_sensor_value	Light Sensor value (0 – 3000)	REAL	4
wlan0ip	Wlan Ip Address	STRING	19
eth0ip	Ethernet Ip Address	STRING	19
	These tags are only for VX model.		
win_ru_battery	Remote battery level	UINT	1
win_ru_charge_state	Battery charge state	UINT	1
win_battery_health	Battery health indicator	UINT	1
win_power_available	Power available status	UINT	1
win_battery_design_capacity	Battery design capacity in mAh	UINT	2
win_battery_cycles	Battery recharge cycle counter	UINT	2
win_ambient_light	Ambient light value	UINT	2
Touch Mode	0 disabled 1 normal 2 glove mode		
Touch State	0 operational 1 disabled 2 disabled by water		