



# INTEGRA

*Evolving next-generation  
outdoor microwave systems*

Customized  
Microwave  
Solutions™



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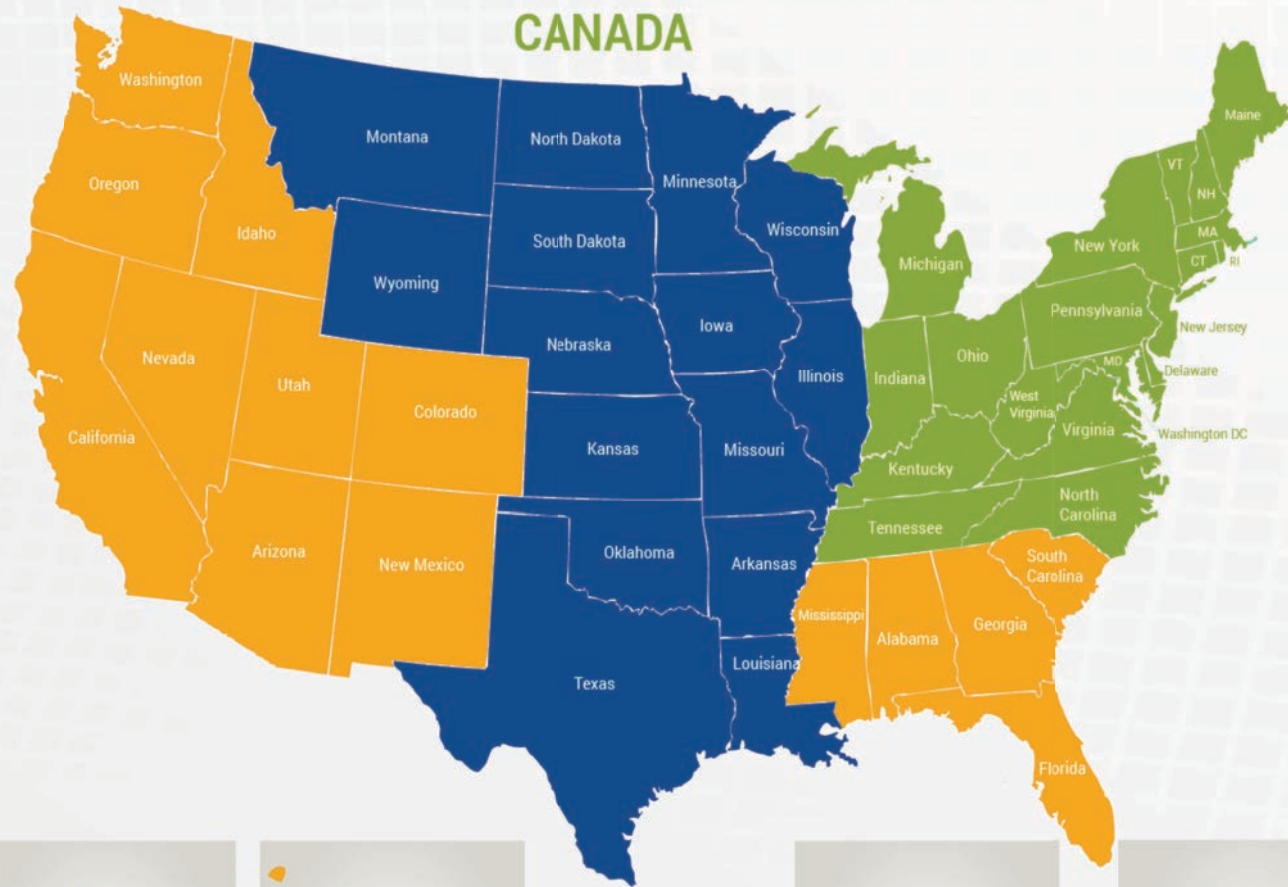
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# SAF products today



CFIP-106 FODU



CFIP Lumina FODU



Freemile 24 FODU



CFIP Phoenix Split Mount



CFIP Marathon FIDU



Freemile 5.8 GE FODU





# Integra Overview

Integrated Ultra-Compact Form Factor with wind-load optimized mount

High Performance 1ft and 2ft Antennas

Carefully selected materials for corrosion resistance

Transparent Port Containing:

- Power LED
- 3.5mm Headphone Jack for Voltmeter and Audio Alignment
- USB port for serial access and Spectrum Compact access\*

Loop and mount for ease of handling and installation



3 GigE Interfaces:

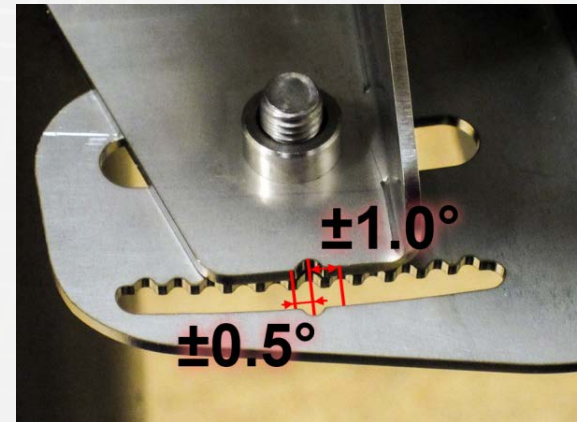
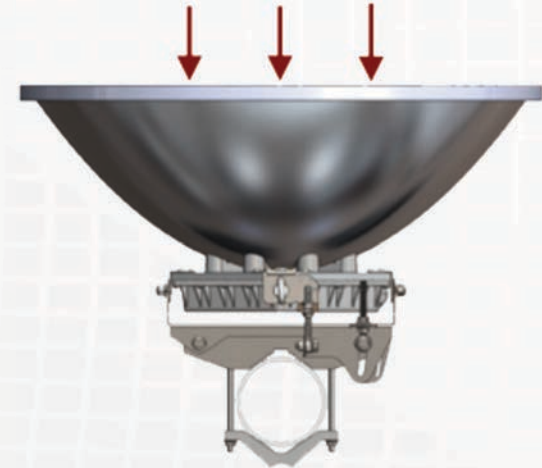
- 1x Electrical/PoE
- 2x SFP



\*Not Available at Launch

# Integra Mount Design Overview

- Centered Mounting
  - Reduces Wind Load On Mast
  - Easier Antenna Alignment
- Supported Pole Size:
  - $\text{Ø } 1.5'' - 4.5''$
  - Half degree alignment notch
- Fixed Horizontal and Vertical Alignment without Antenna



# Integra Feature Overview

- **Max Capacity:**
  - 474Mbps Full Duplex 1+0 Configuration
  - 948Mbps Full Duplex 2+0 Configuration
  - Up to 1Gbps with L2/L3 Header Compression
- **Frequency Band Support (IC / FCC):**
  - 15GHz, 18GHz, 23GHz, 24GHz UL, 38GHz
- **Supported Channel Sizes (IC / FCC):**
  - 5/10/20/30/40/50/60 MHz
- **Supported Modulations:**
  - 4QAM through 1024QAM
  - Hitless Adaptive Modulation (ACM)
- **Output Power:**
  - 0dBm to +20dBm
  - Automatic Transmit Power Control (ATPC)
- **Power supply:**
  - -48 VDC ( $\pm 10\%$ ) Power Over Ethernet (PoE)
  - Average Consumption 25W, Max 35W
- **Carrier Ethernet Features**
  - Header Compression L2/L3\*
  - SyncE
  - IEEE 1588v2 PtP
  - MPLS\*
  - Link Bonding\*
  - 256-Bit AES Encryption\*



*\*Not Available at Launch*

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Customized Microwave Solutions™

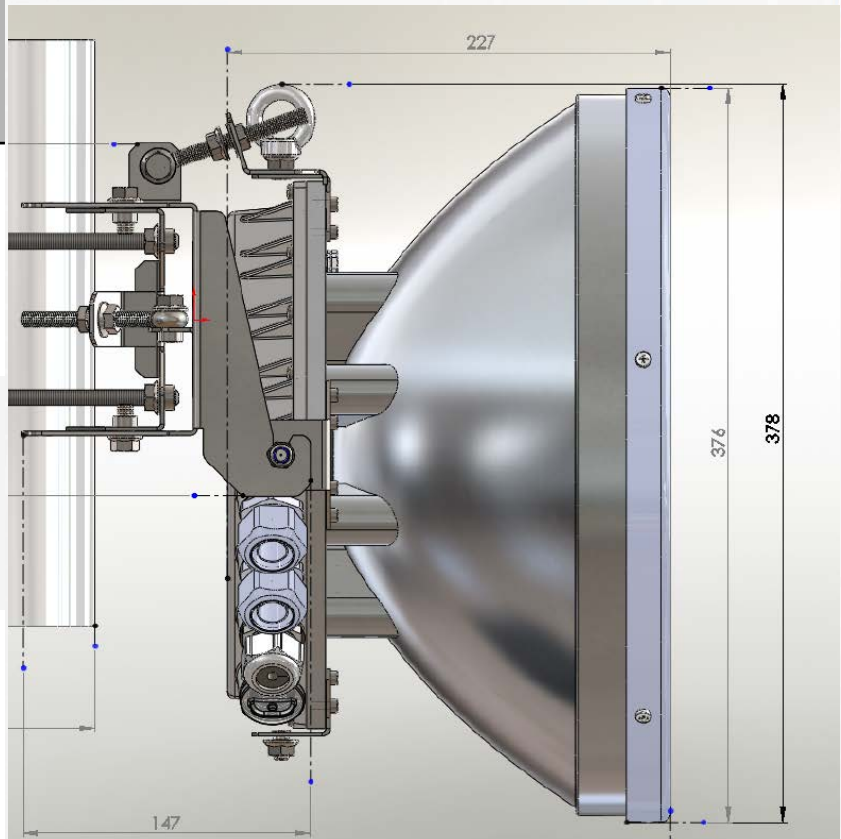
Manufactured In Europe

Confidential and Proprietary

[www.saftehnika.com](http://www.saftehnika.com)

# Antenna

Size	Freq (GHz)	mid gain (dBi)
0.2m	15	29
	18	31
	23	33.2
0.3m	15	32.1
	18	34.2
	23	35.3
0.6m	15	36.8
	18	38.9
	23	40.5





# Integra GUI

Name: SAF   IP address: 192.168.205.10   Serial number: 379710100003   Uptime: 0d 00:28:24   Firmware version: 0.1.9

Main

Over The Air

Networking

Performance

System

### Main

	Local	Remote
Radio side	Low	High
Tx mute	Disabled	Disabled
Tx power	0 dBm	0 dBm
Duplex shift	1560 MHz	1560 MHz
Tx frequency	17810 MHz	19370 MHz
Rx frequency	19370 MHz	17810 MHz
Rx level	-40 dBm	-47 dBm

	Local	Remote
Bandwidth	60 MHz FCC	60 MHz FCC
Modulation	1024QAM FEC ACM	1024QAM WeakFEC ACM
ACM engine	Enabled	Enabled
Acquire status	Locked	Locked
Radial MSE	-40.3 dB	-36.6 dB
FEC Duty	8.2e-07	2.5e-04
Current Rx modulation	1024QAM WeakFEC	1024QAM FEC
Current Tx modulation	1024QAM FEC	1024QAM WeakFEC
Current Rx Ethernet capacity	474.9 Mbps	451.1 Mbps
Current Tx Ethernet capacity	451.1 Mbps	474.9 Mbps

MODIFY

SAVE

LOGOUT

#### System summary

Local	Remote
-40 dBm	-47 dBm
Rx level	1024QAM WeakFEC ACM
-40.3 dB	-36.6 dB
Radial MSE	

### Ethernet

Port	LAN1 ( Electrical )	LAN2 ( SFP )	LAN3 ( SFP )
State	Enabled	Enabled	Enabled
Status	Up	Down	Down

Name: SAF   IP address: 192.168.205.10   Serial number: 379710100003   Uptime: 0d 00:28:24   Firmware version: 0.1.9

Main

Over The Air

Networking

Performance

System

### Performance / Constellation diagram

Everytime Clear All

MODIFY

SAVE

LOGOUT

#### System summary

Local	Remote
-40 dBm	-47 dBm
Rx level	1024QAM WeakFEC ACM
-40.3 dB	-36.6 dB
Radial MSE	

### System / Console

```

SAF>SAF>
SAF>
  configuration      - User configuration commands
  firmware            - Firmware update and information
  ship               - CLI usage
  license             - License commands
  log                - Event / Performance log control and configuration
  modem              - Modem commands
  network             - Network functionality
  product             - Product toolbox
  radio              - Radio commands
  system              - System configuration
    
```





# PERFORMANCE MENU

<b>Name</b> SAF	<b>IP address</b> 192.168.205.10	<b>Serial number</b> 379710100003	<b>Uptime</b> 0d 00:37:15	<b>Firmware version</b> 0.1.9
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Main



Over The Air



Networking



Performance



System

## Main

### Radio

- Radio side
- Tx mute
- Tx power
- Duplex shift
- Tx frequency
- Rx frequency
- Rx level

### Modem

	Local	Remote
Bandwidth	60 MHz FCC	60 MHz FCC
Modulation	1024QAM FEC ACM	1024QAM WeakFEC ACM
ACM engine	Enabled	Enabled
Acquire status	Locked	Locked
Radial MSE	-40.2 dB	-36.8 dB
FEC Duty	7.8e-06	4.4e-04
Current Rx modulation	1024QAM WeakFEC	1024QAM FEC
Current Tx modulation	1024QAM FEC	1024QAM WeakFEC
Current Rx Ethernet capacity	474.9 Mbps	451.1 Mbps
Current Tx Ethernet capacity	451.1 Mbps	474.9 Mbps

### Ethernet

Port	LAN1 ( Electrical )	LAN2 ( SFP )	LAN3 ( SFP )
State	Enabled	Enabled	Enabled
Status	Up	Down	Down

### Alarm

- Alarm status
- Alarm log
- Alarm threshold configuration

### Monitoring

- Performance graph

### Ethernet

- Ethernet switch statistics

### Over The Air

- Equalizer graph
- Constellation diagram
- Modem performance

### System summary

Local	Remote
-41 dBm	-47 dBm
Rx level <input type="text"/>	
-40.2 dB	-36.8 dB
Radial MSE <input type="text"/>	
Tx polarization	



# ETHERNET SWITCH STATISTICS

Name: SAF IP address: 192.168.205.10 Serial number: 379710100003 Uptime: 0d 00:34:55 Firmware version: 0.1.9



Main



Over The Air



Networking



Performance



System

## Performance / Ethernet switch statistics

	LAN1	LAN2	LAN3	WAN	MNG
IngressPackets	160	0	0	139933	62
IngressBytes	23468	0	0	217338930	65840
EgressPackets	145176	51	51	235	108
EgressBytes	224148503	26142	26142	104108	81876
EtherStatsMulticastPkts	43	43	43	N/A	92
EtherStatsBroadcastPkts	3	3	3	N/A	0
EtherStatsPkts64Octets	129	3	3	N/A	0
EtherStatsPkts65to127Octets	106	3	3	N/A	26
EtherStatsPkts128to255Octets	30	9	9	N/A	14
EtherStatsPkts256to511Octets	23	4	4	N/A	8
EtherStatsPkts512to1023Octets	40	19	19	N/A	36
EtherStatsPkts1024to1518Octets	136509	8	8	N/A	8
EtherStatsTXNoErrors	200778	62	62	N/A	137
EtherStatsRXNoErrors	287	0	0	N/A	93
EtherStatsPkts1519to1522Octets	0	0	0	N/A	0
IfInOctets	39350	0	0	N/A	98917
IfOutOctets	305232890	29372	29372	N/A	102868
Dot1dTpPortInFrames	287	0	0	N/A	93
Dot1dTpPortOutFrames	201418	62	62	N/A	137
ReceivedPkts64Octets	103	0	0	N/A	1
TransmittedPkts64Octets	74	5	5	N/A	1
ReceivedPkts65to127Octets	124	0	0	N/A	13
TransmittedPkts65to127Octets	81	5	5	N/A	28
ReceivedPkts128to255Octets	17	0	0	N/A	7
TransmittedPkts128to255Octets	21	11	11	N/A	11
ReceivedPkts256to511Octets	30	0	0	N/A	4
TransmittedPkts256to511Octets	38	9	9	N/A	9
ReceivedPkts512to1023Octets	14	0	0	N/A	11
TransmittedPkts512to1023Octets	46	24	24	N/A	40
ReceivedPkts1024to1518Octets	0	0	0	N/A	0
TransmittedPkts1024to1518Octets	201842	8	8	N/A	8
IfInBroadcastPkts	2	0	0	N/A	0
IfOutBroadcastPkts	4	6	6	N/A	0
IfInMulticastPkts	0	0	0	N/A	36
IfOutMulticastPkts	56	56	56	N/A	97
Dot3InPauseFrames	0	0	0	N/A	0

MODIFY

SAVE

LOGOUT

### System summary

Local	Remote
-40 dBm	-47 dBm
Rx level	
-40.5 dB	-36.9 dB
Radial MSE	
Tx polarization	



# Alarm threshold configuration

**Name** SAF      **IP address** 192.168.205.10      **Serial number** 379710100003      **Uptime** 0d 00:33:56      **Firmware version** 0.1.9



Main



Over The Air



Networking



Performance



System

## Performance / Alarm threshold configuration

Alarm name	Low value	High value	Delta value	Current value
License remaining time	1296000 s		0 s	N/A s
System CPU temperature	-40.0 C	100.0 C	2.0 C	42.5 C
Rx level	-82 dBm	-35 dBm	0 dB	-40 dBm
Radio temperature	-40.0 C	80.0 C	2.0 C	37.0 C
Radial MSE		-9.6 dB	2.0 dB	-40.3 dB
FEC duty		3.00e-03	0.00e+00	1.11e-05
Carrier offset	-250.00 kHz	250.00 kHz	10.00 kHz	8.13 kHz
Modem temperature	-40.0 C	100.0 C	2.0 C	42.5 C
PSU power	20.00 W	40.00 W	2.00 W	33.88 W
PSU voltage	36.00 V	58.00 V	2.00 V	55.00 V
PSU current	0.350 A	1.100 A	0.050 A	0.616 A

- MODIFY
- SAVE
- LOGOUT

### System summary

Local	Remote
-40 dBm	-47 dBm
Rx level	
-40.9 dB	-36.9 dB
Radial MSE	
Tx polarization	



# Header Compression Improvements

- Header compression example for 60MHz channel at 1024QAM modulation, where link capacity is **474 Mbps**
- Table shows maximum improvement achieved, when compressing IP header, Q-in-Q VLANs headers, MAC addresses and Ethernet L1 overhead

Frame size, bytes	Ethernet, Mbps	Throughput gain, %
<b>64</b>	<b>1069.50</b>	56.52
<b>128</b>	715.88	35.14
<b>256</b>	572.95	18.84
<b>512</b>	515.38	9.77
<b>1024</b>	489.38	4.98
<b>1280</b>	484.38	4.00
<b>1518</b>	481.27	3.38

# Integra Benefits - TCO

- **Simplified Installation**

- Innovative mechanical design

- Material choices provide lower weight (Lumina + 2ft Ant @ 33.5lbs / Integra @ 16.6lbs)
    - Mount can be pre-installed for simple Integra installation
    - Intuitive GUI
    - Radio is preinstalled to provide factory guaranteed hermetic seal

- Reduced Bill of Materials (BOM)

- Integrated antenna
    - SFP interfaces
    - Compact design + lower weight = lower shipping costs

- Lowest power consumption available

- Lumina 18GHz @ 32w vs. Integra 18GHz @ 20w

# Integra Benefits – Performance

- **Increased System Gain @ 256QAM vs. Lumina**
  - 5dB additional link budget
- **Increased Capacity with 60MHz wide channel, 1024QAM modulation, and header compression**
  - Up to 474Mbps without header compression
  - Up to 1Gbps with header compression
- **Advanced Ethernet Functionality**
  - Bandwidth aware QoS
  - AES Encryption
  - SyncE
  - Link Bonding
  - 6 Core Network Processor
  - *And much more!*





# Integra 2014' key product activities:

- 17GHz Integra
- 24GHz Integra
- 38GHz Integra
- Integra with wideband channels, increased Tx power.
- Slip-fit Integra for larger antenna sizes
- 42 GHz Integra

# Key Software Development releases:

- Software updates for Integra:
- Header compression
- 2+0 link bonding
- Advanced QoS
- Security functionality, encryption, HTTPS
- And more

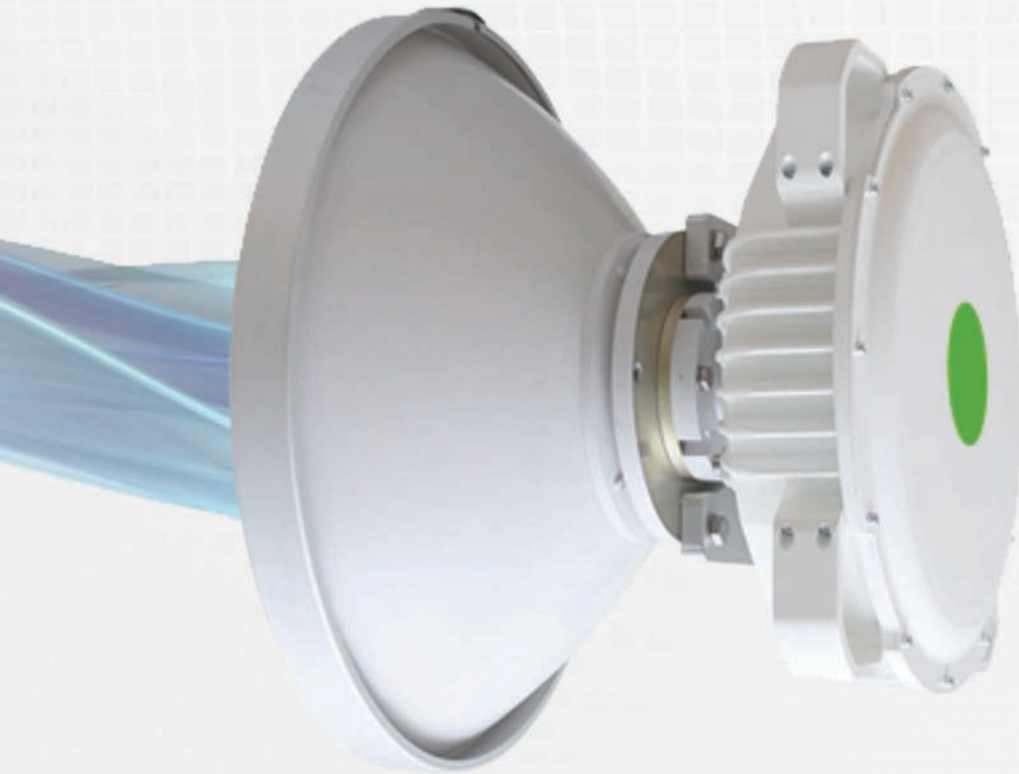
# SAF Customized solutions

- Low Latency radio optimization solutions
- Specific radio frequencies (7 / 13 / 30 GHz)
- Web interface and firmware modifications
- Integration and tests with other equipment
- Hybrid interface or specific data interface (Broadcasting)
- Alternative power sources solutions (solar)
- Custom color radios / antennas
- Custom cabling
- Visit SAF factory in Latvia and meet R&D team to discuss other specific requirements!





# CFIP-106 Wireless Without Limits Promotion!



- CFIP-106 Complete Link - **\$4,500 MSRP** Thru March 31<sup>st</sup>!
  - 100Mbps Full Duplex Capacity
  - No Software or License Keys
  - Includes 1ft Antennas and PoE Injectors/Power Supplies
  - 11/13/18/23/24 GHz
  - High Power & Larger Antennas Extra



# Thank you!

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