



Reference

Classifier Description

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1. General Information

This document provides detailed information about the capabilities and operational limits of the PROCITEC GmbH signal classifiers. If one or more of these operational limits are exceeded, the signal classifiers may not function correctly. Due to the unpredictable nature of received signal quality across the HF-UHF portions of the RF spectrum, there can be no guarantee of error-free operation within the limits described here.

The technical specifications for our range of products are published on our website: www.procitec.com. The information in this document is generic, and does not necessarily apply to the specification of a particular product.

1.1. Frequency Range

Classifiers make use of the nominal signal frequency to adjust their behaviour. Therefore the specification of classifiers differs depending on the frequency range. Outside the listed frequency ranges the classifiers are inactive.

Within this document we use the following naming convention for frequency ranges:

Notation	Connotation	Frequency range in MHz
HF	High frequency	3 - 30
VHF	Very high frequency	30 - 300
UHF	Ultra high frequency	300 - 3000
V/UHF	VHF and UHF	30 - 3000

Table 1: Definition of frequency ranges

1.2. Bandwidth

Bandwidth indicates the bandwidth range for which the respective classifier is active. Classifiers require the signal bandwidth to be within the specified bandwidth range. The bandwidth of a signal is defined as the difference between the upper and lower frequency-limits of the signal.

1.3. Carrier-to-Noise Ratio and E_b/N_0

For reliable classification all classifiers need a signal of sufficient quality. We specify the minimum signal quality for modulation type classifiers in terms of Carrier-to-Noise ratio (CNR) or E_b/N_0 .

The CNR is the ratio of the mean carrier power to the mean noise power within the bandwidth of the emission.

The quantity E_b/N_0 is the ratio of the energy per bit to the noise power density under the assumption of white gaussian noise.

1.4. Minimum Signal Duration for Classification

There is no single or standard value of a signal's minimum duration for the signal to be classified successfully. For successful classification results, the processing of signals with lower symbol rates requires longer signal durations than the processing of signals with higher symbol rates. Additionally, the processing of modems with complex signaling structures typically requires longer signal durations for successful classification.

2. Modulation Type Classifiers

2.1. Phase Shift Keying (PSK)

- Modulation order M : number of constellation points
- Version:
 - A has a fixed constellation
 - B uses two identical constellations, which are rotated by $\frac{\pi}{M}$ radians with respect to one another. The two constellations are used alternately for even and odd symbol timeslots.
- Autocorrelation property: if autocorrelation property is detected, the following value(s) will be reported:
 - Autocorrelation peaks: up to 10 pairs of highest detected autocorrelations peak's position, i.e., time delay in msec and its normalized magnitude.
 - Periodicity: The value is the estimated greatest common divisor of detected autocorrelation peaks. If no periodicity is detected, no value will be reported.

PSK2	HF	V/UHF
Symbol rate (Bd)	31.25 - 4800	100 - 50000000
Bandwidth (kHz)	up to 50	up to 100000
Version	A and B	
Minimum Eb/N0 for detection (dB)	10	

Table 2: PSK2

PSK4	HF	V/UHF
Symbol rate (Bd)	31.25 - 4800	100 - 50000000
Bandwidth (kHz)	up to 50	up to 100000
Version	A and B	
Minimum Eb/N0 for detection (dB)	12	

Table 3: PSK4

PSK8	HF	V/UHF
Symbol rate (Bd)	31.25 - 4800	100 - 50000000
Bandwidth (kHz)	up to 50	up to 100000
Version	A and B	

PSK8	HF	V/UHF
Minimum Eb/N0 for detection (dB)	13	13
Minimum Eb/N0 for A/B differentiation (dB)	>15	>15

Table 4: PSK8

PSK16	HF	V/UHF
Symbol rate (Bd)	100 - 4800	100 - 50000000
Bandwidth (kHz)	up to 50	up to 100000
Version	No A/B differentiation	
Minimum Eb/N0 for detection (dB)	18	

Table 5: PSK16

OQPSK	V/UHF
Symbol rate (Bd)	100 - 50000000
Bandwidth (kHz)	up to 100000
Minimum Eb/N0 for detection (dB)	10

Table 6: OQPSK

2.2. Frequency Shift Keying (FSK)

- Shift = Offset between neighbouring tones
- Modulation Index $m = \frac{\text{Shift}}{\text{Symbol rate}}$
- Equally spaced tones

FSK2	HF	V/UHF	V/UHF
Symbol rate (Bd)	25 - 4800	1200 - 25000	25000 - 75000
Modulation index	1 - 10	1 - 10	0.75 - 1.5
Bandwidth (kHz)	up to 50	up to 230	
Minimum Eb/N0 (dB)	11 - 15	11 - 15	25

Table 7: FSK2

2.3. Minimum Shift Keying (MSK)

Parameter	HF	V/UHF
Symbol rate (Bd)	100 - 4800	1200 - 125000
Modulation index	0.5	
Bandwidth (kHz)	up to 50	up to 200
Minimum Eb/N0 (dB)	14 - 16	

Table 8: MSK

2.4. Gaussian Minimum Shift Keying (GMSK)

Parameter	HF	V/UHF
Symbol rate (Bd)	300 - 4800	1200 - 125000
Modulation index	0.5	
Bandwidth (kHz)	up to 50	up to 200
Minimum Eb/N0 (dB)	14 - 16	

Table 9: GMSK

2.5. Multitone (MFSK)

- Shift = Offset between neighbouring tones
- Modulation Index $m = \frac{\text{Shift}}{\text{Symbol rate}}$
- Equally spaced tones
- Requires Shift > SymbolRate ($m > 1$)

FSK4	HF	V/UHF
Symbol rate (Bd)	25 - 4800	1200 - 25000
Bandwidth (kHz)	up to 50	up to 230
Minimum Eb/N0 (dB)	14 - 16	

Table 10: FSK4

Parameter	HF and V/UHF
Symbol rate (Bd)	5 - 330
Tone count	5 - 64
Bandwidth (kHz)	up to 50
Minimum Eb/N0 (dB)	14 - 16

Table 11: MFSK

2.6. Multi-Channel Binary Frequency Shift Keying (MCFSK2)

- Shift = Offset between neighbouring tones of single FSK2
- Modulation Index $m = \frac{\text{Shift}}{\text{Symbol rate}}$
- Requires channel distance to be larger than twice the shift
- Requires **Extended Classifier** license

Parameter	HF
Symbol rate (Bd)	40 - 250
Shift (Hz)	> 50
Channel distance (Hz)	120 - 1000
Modulation index	> 1
Tone count	2
Channel count	2 - 64
Bandwidth (kHz)	up to 50
Minimum Eb/N0 (dB)	17

Table 12: MCFSK2

2.7. Multi-Channel Phase Shift Keying (MCPSK)

Parameter	HF and V/UHF
Symbol rate (Bd)	31.25 – 250
Channel distance (Hz)	50 - 300
Channel count	2 - 64
PSK order	2, 4
PSK version	A and B
Bandwidth (kHz)	up to 10
Minimum Eb/N0 (dB)	13 - 15

Table 13: MCPSK

2.8. Orthogonal Frequency Division Multiplexing (OFDM)

- Tg/Tu ratio = Guard interval to useful symbol length ratio

Parameter	HF and V/UHF	V/UHF
Bandwidth (kHz)	up to 50	50 - 12500

Parameter	HF and V/UHF	V/UHF
Min Symbol rate (Bd)	25	50
Max Channel distance (Hz)	250	15000
Subcarrier	25 - 512	128 - 32768
Tg/Tu ratio	0.125 - 1.0	0.0625 - 0.25
Minimum Eb/N0 (dB)	12 - 20	

Table 14: OFDM

2.9. Quadrature Amplitude Modulation (QAM)

- Order is not part of the classification result
- Requires rectangular constellation
- Requires **Extended Classifier** license

Parameter	HF	V/UHF
Symbol rate (Bd)	1600 - 4800	1600 - 25000
Order	16, 32, 64	
Bandwidth (kHz)	up to 50	up to 50
Minimum Eb/N0 (dB)	22	

Table 15: QAM

2.10. Amplitude Shift Keying (ASK)

Parameter	V/UHF
Symbol rate (Bd)	100 - 50000
Order	2, 4
Bandwidth (kHz)	up to 175
Minimum Eb/N0 (dB)	ASK2: 14, ASK4: 18

Table 16: ASK

2.11. Morse

Parameter	HF
Symbol rate (CPM)	30 - 250
Bandwidth (kHz)	up to 1

Parameter	HF
Minimum CNR (dB)	15

Table 17: Morse

2.12. Voice

- Voice DSB-SC requires **Extended Classifier** license

Parameter	HF and V/UHF	HF and V/UHF
Type	AM, USB, LSB, DSB-SC	NFM
Frequency Range (MHz)	3 - 3000	25 - 3000
Bandwidth (kHz)	1 - 20	
Minimum CNR (dB)	25	

Table 18: Voice

2.13. Wideband FM

- Supports only FM Radio broadcast

Parameter	VHF
Frequency Range (MHz)	65 - 108
Bandwidth (kHz)	50 - 350
Minimum CNR (dB)	25

Table 19: Wideband FM

2.14. Carrier

Parameter	HF and V/UHF
Bandwidth (Hz)	up to 500

Table 20: Carrier

2.15. Over The Horizon Radar (OTH Radar)

- Supports only FMCW Radars (Frequency-Modulated Continuous-Wave Radars)

Parameter	HF
Bandwidth (kHz)	6 - 50

Table 21: OTH Radar

2.16. Voice Frequency Telegraphy (VFT)

- Shift = Offset between neighbouring tones
- only for FM demodulated signal
- Requires explicit definition of classifier to use, i.e.:
 - <FLD_BCU_CLASSIFIER_USAGE>VFT<FLD_BCU_CLASSIFIER_USAGE>
- Support only VFT Signal from ITU-T standard:

Standard	Symbol rate (Bd)	Shift (Hz)	Channel distance (Hz)	Channel count
ITU-T R.35	50	60	120	24
ITU-T R.37	100	120	240	12
ITU-T R.38 B	200	180	360	8
ITU-T R.38 A	200	240	480	6

Table 22: Supported VFT modulations

Parameter	HF and V/UHF
Bandwidth (kHz)	3
Minimum active channel	2
Minimum duration (s)	4

Table 23: VFT

2.17. Frequency Modulation - Frequency Division Multiplex (FM-FDM)

- Only available in SignalServer application
- Requires the explicit definition of a single classifier to use:
 - <FLD_BCU_CLASSIFIER_USAGE>FM-FDM<FLD_BCU_CLASSIFIER_USAGE>
- Supported FDM channel bandwidth: 4 kHz
- Requires the presence of characteristic frequencies in the FM demodulated FDM signal
 - Type "Pilot tone": The emission is recognized by the detection of a single tone at a specific frequency (default 18 kHz)
 - Type "FSK traffic": The emission is recognized by the detection of an active FSK2 emission at specific tone frequencies (no default)

- Type "FSK idle": The emission is recognized by the detection of two idle FSK2 emissions (one continuous tone per FSK2) at specific tone frequencies (no default)

For the definition of custom characteristic frequencies additional *FDMTypeDef* elements can be inserted into the application's configuration file or the Spectrum Collection Profile configuration files.

```
<ClassifierSettings>
  <FM-FDM>
    <!-- insert FDMTypedefs here -->
  </FM-FDM>
</ClassifierSettings>
```

- Pilot tone

```
<FDMTypeDef>
  <add key="Pilottone" value="Frequency" />
</FDMTypeDef>
```

Where *Frequency* is the numerical value of the tone frequency

- FSK traffic

```
<FDMTypeDef>
  <add key="FSK" value="LowToneFrequency,HighToneFrequency" />
</FDMTypeDef>
```

Where *LowToneFrequency*, *HighToneFrequency* are the numerical values of the FSK2 tone frequencies

- FSK idle

```
<FDMTypeDef>
  <add key="FSK" value="LowToneFrequency1,HighToneFrequency1,↔
    LowToneFrequency2,HighToneFrequency2" />
</FDMTypeDef>
```

Where *LowToneFrequency1*, *HighToneFrequency1*, *LowToneFrequency2*, *HighToneFrequency2* are the numerical values of the tone frequencies of the two FSK2s

It is possible to define multiple *FDMTypeDef* elements.

- Requires the additional presence of an active FDM channel

Parameter	V/UHF
Bandwidth (kHz)	up to 500

Table 24: FM-FDM

3. Modem Classifiers

The tables below contain the relevant information about the modem classifiers:

- Modem ID = Unique identifier used in classification results to identify the detected modem.
- Modulation Parameters = Reported modulation parameters when the modem is detected, includes modulation type, symbol rate and distance between channels.
- Frequency range and bandwidth please see *General Information*.

3.1. Standard Modems

3.1.1. ACARS VHF

	Value
Modem ID	100
Modulation parameters	MSK 2400Bd
Frequency range (MHz)	129 - 137
Bandwidth (kHz)	4.8 - 10.5

Table 25: ACARS VHF

3.1.2. CODAN 3012/3212 16 Channel PSK

	Value
Modem ID	16
Modulation parameters	16ch PSK4A 75Bd 112.5Hz
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	1 - 6

Table 26: CODAN 3012/3212 16 Channel PSK

3.1.3. DAB

	Value
Modem ID	42
Alias	Digital Audio Broadcasting
Modulation parameters	OFDM

	Value
Frequency range (MHz)	174 - 240
Bandwidth (MHz)	0.1 - 2

Table 27: DAB

3.1.4. DECT

	Value
Modem ID	40
Modulation parameters	Multiple modulations possible
Frequency range (MHz)	902 - 928
Frequency range (GHz)	1.786 - 1.792
Frequency range (GHz)	1.880 - 2.025
Frequency range (GHz)	2.4 - 2.4834
Bandwidth (MHz)	0.55 - 3.2

Table 28: DECT

3.1.5. DVB-T 8MHz Mode

	Value
Modem ID	43
Alias	Digital Video Broadcasting Terrestrial
Modulation parameters	OFDM
Frequency range (MHz)	174 - 230
Frequency range (MHz)	470 - 862
Bandwidth (MHz)	0.5 - 8

Table 29: DVB-T 8MHz Mode

3.1.6. Flex

	Value
Modem ID	44
Modulation parameters	Multiple modulations possible
Frequency range (MHz)	148 - 932
Bandwidth (kHz)	5 - 20

Table 30: Flex

3.1.7. GSM

	Value
Modem ID	21
Modulation parameters	(G)MSK 270833Bd
Frequency range (MHz)	380 - 497
Frequency range (MHz)	697 - 970
Frequency range (GHz)	1.7 - 2
Bandwidth (kHz)	180 - 380

Table 31: GSM

3.1.8. HF DL

	Value
Modem ID	3
Modulation parameters	PSK2A 1800Bd
Frequency range (MHz)	2.9 - 30
Bandwidth (kHz)	0.15 - 3

Table 32: HF DL

3.1.9. UMTS/LTE

	Value
Modem ID	38
Modulation parameters	<i>Multiple modulations possible</i>
Frequency range (MHz)	700 - 1000
Frequency range (GHz)	1.7 - 1.88
Frequency range (GHz)	1.9 - 2.7
Frequency range (GHz)	3.4 - 3.8
Frequency range (GHz)	5 - 6
Bandwidth (MHz)	0.1 - 20

Table 33: UMTS/LTE

3.1.10. PACTOR

	Value
Modem ID	1001
Modulation parameters	<i>Multiple modulations possible</i>
Frequency range (MHz)	0 - 30
Bandwidth (kHz)	0.18 - 1.8

Table 34: PACTOR

3.1.11. PACTOR II FEC

	Value
Modem ID	17
Alias	PACTOR
Modulation parameters	2ch PSK4B 100Bd 200Hz
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	0.3 - 1

Table 35: PACTOR II FEC

3.1.12. PACTOR-4

	Value
Modem ID	4
Modulation parameters	<i>Multiple modulations possible</i>
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	2 - 3

Table 36: PACTOR-4

3.1.13. VDL 2

	Value
Modem ID	33
Modulation parameters	PSK8A 10500Bd
Frequency range (MHz)	117.9 - 137.5
Bandwidth (kHz)	6 - 25

Table 37: VDL 2

3.2. PMR Modems

3.2.1. APCO-25

	Value
Modem ID	11
Modulation parameters	C4FM (FSK4) 4800Bd 1200Hz
Frequency range (MHz)	30 - 3000
Bandwidth (kHz)	5.5 - 18

Table 38: APCO-25

3.2.2. APCO-25 Phase2 Downlink

	Value
Modem ID	28
Modulation parameters	PSK4B 6000Bd
Frequency range (MHz)	100 - 875
Bandwidth (kHz)	7.5 - 13.5

Table 39: APCO-25 Phase2 Downlink

3.2.3. DMR

	Value
Modem ID	18
Modulation parameters	FSK4 4800Bd 1296Hz
Frequency range (MHz)	30 - 3000
Bandwidth (kHz)	2 - 15

Table 40: DMR

3.2.4. DMR Continuous

	Value
Modem ID	10
Modulation parameters	FSK4 4800Bd 1296Hz
Frequency range (MHz)	30 - 3000
Bandwidth (kHz)	6 - 15

Table 41: DMR Continuous

3.2.5. dPMR

	Value
Modem ID	9
Modulation parameters	FSK4 2400Bd 700Hz
Frequency range (MHz)	30 - 3000
Bandwidth (kHz)	2 - 12

Table 42: dPMR

3.2.6. D-STAR

	Value
Modem ID	14
Modulation parameters	MSK 4800Bd
Frequency range (MHz)	100 - 1500
Bandwidth (kHz)	3.2 - 15

Table 43: D-STAR

3.2.7. MPT1327

	Value
Modem ID	13
Modulation parameters	FFSK (MSK) 1200Bd
Frequency range (MHz)	161.5 - 210
Frequency range (MHz)	415 - 445
Frequency range (MHz)	800 - 850
Bandwidth (kHz)	3.7 - 12.5

Table 44: MPT1327

3.2.8. NXDN 2400Bd

	Value
Modem ID	12
Modulation parameters	C4FM (FSK4) 2400Bd 700Hz
Frequency range (MHz)	136 - 174
Frequency range (MHz)	400 - 520
Bandwidth (kHz)	2.5 - 4

	Value
--	-------

Table 45: NXDN 2400Bd

3.2.9. NXDN 4800Bd

	Value
Modem ID	20
Modulation parameters	C4FM (FSK4) 4800Bd 1600Hz
Frequency range (MHz)	136 - 174
Frequency range (MHz)	400 - 520
Bandwidth (kHz)	7.5 - 10

Table 46: NXDN 4800Bd

3.2.10. TETRA

	Value
Modem ID	7
Alias	TETRA Downlink
Modulation parameters	PSK4B 18000Bd
Frequency range (MHz)	30 - 3000
Bandwidth (kHz)	17 - 80

Table 47: TETRA

3.2.11. TETRA Uplink

	Value
Modem ID	19
Modulation parameters	PSK4B 18000Bd
Frequency range (MHz)	379 - 390.5
Frequency range (MHz)	409 - 431
Frequency range (MHz)	449 - 461
Frequency range (MHz)	869.5 - 876.5
Bandwidth (kHz)	16 - 30

Table 48: TETRA Uplink

3.2.12. Tetrapol

	Value
Modem ID	8
Modulation parameters	MSK 8000Bd
Frequency range (MHz)	70 - 520
Bandwidth (kHz)	6 - 10.5

Table 49: Tetrapol

3.2.13. Yaesu System Fusion NB

	Value
Modem ID	29
Modulation parameters	C4FM (FSK4) 4800Bd 900Hz
Frequency range (MHz)	140 - 460
Bandwidth (kHz)	4 - 12

Table 50: Yaesu System Fusion NB

3.2.14. Yaesu System Fusion

	Value
Modem ID	30
Modulation parameters	C4FM (FSK4) 4800Bd 1800Hz
Frequency range (MHz)	140 - 460
Bandwidth (kHz)	6 - 15

Table 51: Yaesu System Fusion

3.3. Military Modems

3.3.1. ALE 3G

	Value
Modem ID	31
Alias	STANAG 4538
Modulation parameters	PSK8A 2400Bd
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	1.8 - 6

Table 52: ALE 3G

3.3.2. ALE 4G

	Value
Modem ID	41
Alias	MIL-STD-188-141D Appendix G
Alias	Wideband ALE (WALE)
Modulation parameters	PSK8A 2400Bd
Frequency range (MHz)	2 - 30
Bandwidth (kHz)	1.8 - 6

Table 53: ALE 4G

3.3.3. CHN 4+4

	Value
Modem ID	32
Modulation parameters	8ch PSK4B 75Bd 300Hz
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	0.3 - 5

Table 54: CHN 4+4

3.3.4. CHN MIL Hybrid 8FSK-PSK

	Value
Modem ID	37
Modulation parameters	Multiple modulations possible

	Value
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	0.7 - 3

Table 55: CHN MIL Hybrid 8FSK-PSK

3.3.5. CIS Akula 500Bd/1000Hz

	Value
Modem ID	45
Modulation parameters	FSK2
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	1.2 - 3.0

Table 56: CIS Akula 500Bd/1000Hz

3.3.6. CIS-45 OFDM 33.3Bd

	Value
Modem ID	22
Modulation parameters	OFDM 45 subcarriers, 33.3Bd 62.5Hz
Detection	Traffic on all subcarriers
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	1.2 - 3.8

Table 57: CIS-45 OFDM 33.3Bd

3.3.7. CIS-45 OFDM 40Bd

	Value
Modem ID	23
Modulation parameters	OFDM 45 subcarriers, 40Bd 62.5Hz
Detection	Traffic on all subcarriers
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	1.4 - 3.8

Table 58: CIS-45 OFDM 40Bd

3.3.8. CIS-60 OFDM 30Bd

	Value
Modem ID	24
Modulation parameters	OFDM 60 subcarriers, 30Bd 44.4Hz
Detection	Traffic on all subcarriers
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	1.8 - 3.5

Table 59: CIS-60 OFDM 30Bd

3.3.9. CIS-60 OFDM 35.55Bd

	Value
Modem ID	47
Modulation parameters	OFDM 60 subcarriers, 35.55Bd 44.4Hz
Detection	Traffic on all subcarriers
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	1.8 - 3.5

Table 60: CIS-60 OFDM 35.55Bd

3.3.10. CIS-93 OFDM

	Value
Modem ID	25
Modulation parameters	OFDM 93 subcarriers, 22Bd 31.25Hz
Detection	Traffic on all subcarriers
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	1.8 - 3.5

Table 61: CIS-93 OFDM

3.3.11. CIS-112 OFDM

	Value
Modem ID	26
Modulation parameters	OFDM 112 subcarriers, 22.2Bd 25.6Hz
Detection	Traffic on all subcarriers
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	1.8 - 4

	Value
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Table 62: CIS-112 OFDM

3.3.12. CIS-128 OFDM 3kHz

	Value
Modem ID	27
Modulation parameters	OFDM 128 subcarriers, 21Bd 23.5Hz
Detection	Traffic on all subcarriers
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	1.8 - 4

Table 63: CIS-128 OFDM 3kHz

3.3.13. Link 11 CLEW

	Value
Modem ID	5
Modulation parameters	14ch PSK4A 75Bd 110Hz
Frequency range (MHz)	2 - 30
Bandwidth (kHz)	0.15 - 8

Table 64: Link 11 CLEW

3.3.14. Link 11 SLEW

	Value
Modem ID	6
Modulation parameters	PSK8A 2400Bd
Frequency range (MHz)	2 - 400
Bandwidth (kHz)	2.5 - 4

Table 65: Link 11 SLEW

3.3.15. Link 22

	Value
Modem ID	46
Modulation parameters	PSK4A/PSK8A 2400Bd

	Value
Frequency range (MHz)	2 - 30
Bandwidth (kHz)	1.8 - 6

Table 66: Link 22

3.3.16. MIL 188-110C App.D

	Value
Modem ID	39
Modulation parameters	<i>Multiple modulations possible</i>
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	1.8 - 25

Table 67: MIL 188-110C App.D

3.3.17. STANAG 4539/4415

	Value
Modem ID	2
Alias	MIL-STD-188-110A Serial (single-tone) mode
Modulation parameters	PSK8A 2400Bd
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	1.8 - 6

Table 68: STANAG 4539/4415

3.3.18. STANAG 4539 HDR

	Value
Modem ID	15
Alias	MIL-STD-188-110B/C App. C
Modulation parameters	PSK8A 2400Bd
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	1.8 - 6

Table 69: STANAG 4539 HDR

3.3.19. STANAG 4285/4481 (PSK)

	Value
Modem ID	0
Modulation parameters	PSK8A 2400Bd
Frequency range (MHz)	1.89 - 30
Bandwidth (kHz)	1.8 - 10

Table 70: STANAG 4285/4481 (PSK)

3.3.20. STANAG 4529

	Value
Modem ID	1
Modulation parameters	PSK8A 1200Bd
Frequency range (MHz)	3 - 30
Bandwidth (kHz)	0.744 - 3

Table 71: STANAG 4529

3.4. SAT Phone Modems

3.4.1. Thuraya Uplink

	Value
Modem ID	1002
Modulation parameters	PSK4B 23400Bd
Frequency range (GHz)	1.625 - 1.661
Bandwidth (kHz)	15 - 40

Table 72: Thuraya Uplink

3.4.2. Iridium Uplink

	Value
Modem ID	1003
Modulation parameters	PSK4A 25000Bd
Frequency range (GHz)	1.616 - 1.627
Bandwidth (kHz)	9 - 71.5

Table 73: Iridium Uplink

3.4.3. INMARSAT IsatPhone Uplink

	Value
Modem ID	34
Modulation parameters	(G)MSK 67708Bd
Frequency range (GHz)	1.626 - 1.647
Bandwidth (kHz)	20 - 150

Table 74: INMARSAT IsatPhone Uplink

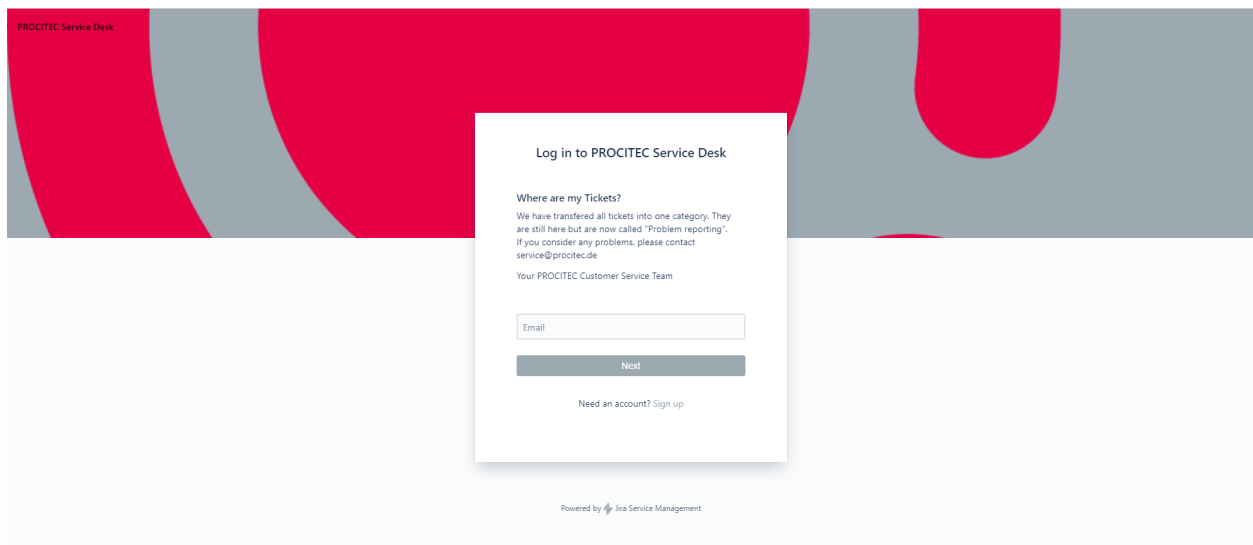
A. Support

Requests and suggestions?

All requests or suggestions regarding our go2signals product-range are very much appreciated; we would be delighted to hear from you.

Any questions? We are happy to assist you!

If you have any further questions, please do not hesitate to contact our Support Team for rapid assistance – just raise a service request at: <http://servicedesk.procitec.com>.



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