

You are controlling the ground station.

Observer Hardware [hide] :

[webcam] [streaming]

Callsign	Latitude	Longitude	Altitude	Azimuth	Elevation	Sender Frequency	Receiver Frequency	Supervisor Session	Online Session
JQ1ZKL	N 35.611°	E 139.351°	0.160 km	179°	0°	437.325000 MHz	437.207022 MHz	127, 0, 0, 1	2

Satellite Database [hide] : [database]

Name	Callsign	Beacon Mode	Beacon Frequency	Beacon Drift	Sender Mode	Sender Frequency	Sender Drift	Receiver Mode	Receiver Frequency	Receiver Drift
INVADER (CO-77)	JQ1ZKK	CW	437.325000 MHz	+0 Hz	FM	437.325000 MHz	+0 Hz	FM	437.200000 MHz	-1000 Hz

TLE [Last check 2014/05/20 15:49:18 JST]

1 39577U 140005 14129.33701450 00104318 00000-0 67626 3 0 1243
2 39577 00000-0 67626 3 0 1243

Satellite Status [hide] :

Latitude	Longitude	Altitude	Azimuth	Elevation	Beacon Frequency	Sender Frequency	Receiver Frequency	Sender Doppler Shift	Receiver Doppler Shift
S 20.760°	E 147.060°	341.530 km	171.13°	9.9°	437.325000 MHz	437.325000 MHz	437.200000 MHz	+18.519 %	100.001835 %
Current Time		AOS	Rotation Start	LOS	MEL				
2014/05/20 15:50:38 JST		2014/05/20 17:32:41 JST	2014/05/20 17:32:41 JST	2014/05/20 17:41:27 JST	+18.519°				
		Δ 01:42:03	Δ 01:42:03	Δ 01:50:49					

地上局ソフトウェアの設計と実装

Operation Control [hide] :

Category	Command
Normal Operation	<input type="button" value="STA"/> <input type="button" value="MRR"/>
Telemetry Index	<input type="button" value="PTI"/>
Telemetry Data	<input type="text" value="0014100"/> <input type="button" value="PTR"/> <input type="button" value="remove"/> <input type="button" value="clear"/> <input type="text" value="0014100"/> <input type="button" value="append"/>
Boot Mode	<input type="button" value="GRS"/> <input type="text" value="000 - Self Test"/> <input type="button" value="GWA"/>
Text Param	<input type="text" value="X"/> <input type="button" value="GRS"/> <input type="text"/> <input type="button" value="GWA"/>
VM Param	<input type="button" value="GRS"/> <input type="text"/> <input type="button" value="GWA"/>
Note Param	<input type="button" value="GRS"/> <input type="text" value="d3 4 e3 4 f3 4 f#3 4 a3 4 b3 4 c4 4 c#4 4 e4 2. - 4 d3 4 e3 4 f3 4 f#3 4 a3 4 b3 4 c4 4 c#4 4 d4 2. - 4 d3 4 e3 4 f#3 4 g3 4 a3 4 b3 4 c4 4 c#4 4 e4 2. - 4"/> <input type="button" value="GWA"/>
Morse Param	<input type="button" value="GRS"/> <input type="text"/> <input type="button" value="GWA"/>
Digitalker Param	<input type="button" value="GRS"/> <input type="text"/> <input type="button" value="GWA"/>
Camera Param	<input type="button" value="GRS"/> <input type="text"/> <input type="button" value="GWA"/>
Camera Data	line : <input type="button" value="GRS"/>
Mission Power	<input type="button" value="MSR"/> <input type="button" value="MSD"/> OBC Time : 0x <input type="text"/> offset : <input type="text"/> h <input type="text"/> m <input type="text"/> s duration : <input type="text"/> h <input type="text"/> m <input type="text"/> s <input type="button" value="SMS"/>

超小型衛星の運用に適したネットワーク対応 地上局ソフトウェアの設計と実装

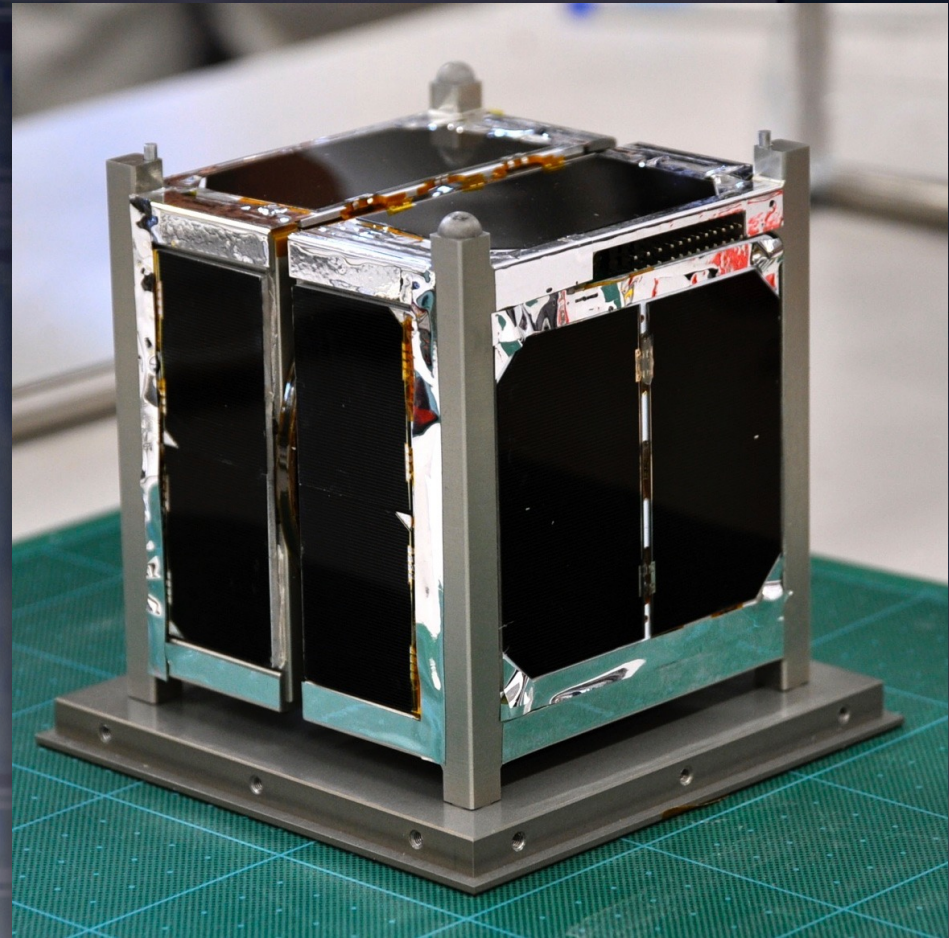
ARTSAT 衛星芸術プロジェクト
堀口淳史・橋本論・久保田晃弘

ARTSAT プロジェクト

- ・ 2011 年夏頃より多摩美術大学と東京大学の共同プロジェクトとして始動
- ・ 2014 年 02 月に超小型人工衛星 INVADER を H-IIA ロケットにより打ち上げ
- ・ 2014 年 12 月に 50cm 級宇宙機 DESPATCH を H-IIA ロケットにより打ち上げ

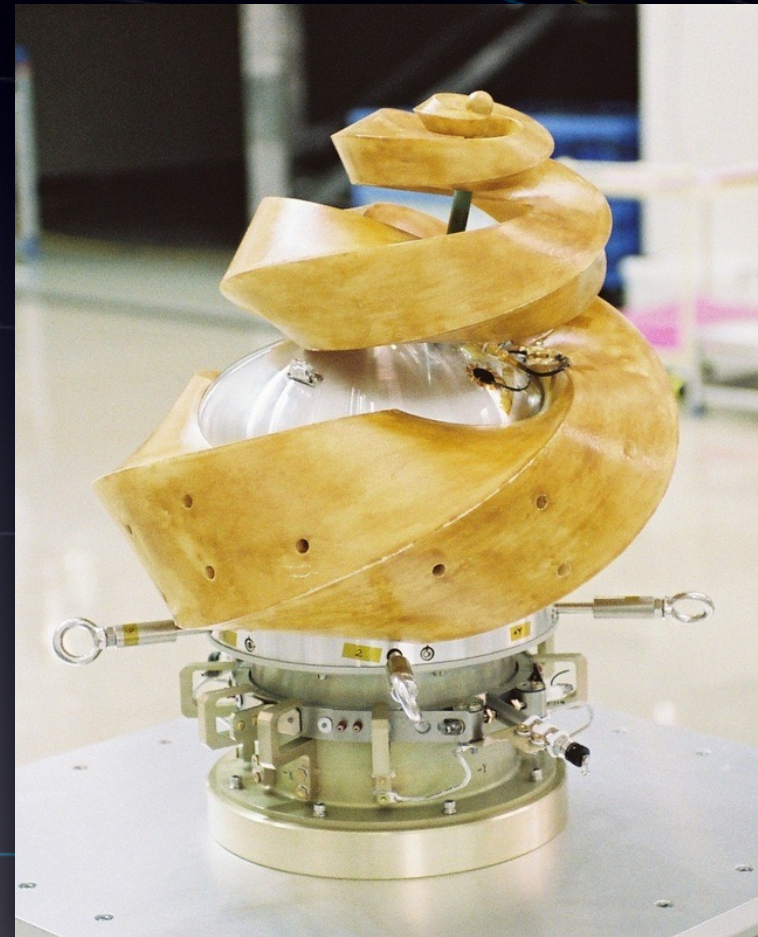
ARTSAT1:INVADER

- ・ 10cm 級 CubeSAT
- ・ 2014/02/28 ~
2014/09/02 まで運用
- ・ アマチュア無線帯で通信



ARTSAT2:DESPATCH

- ・ 50cm 級宇宙機
- ・ 2014/12/03 ~
2015/01/03 まで運用
- ・ アマチュア無線帯で通信



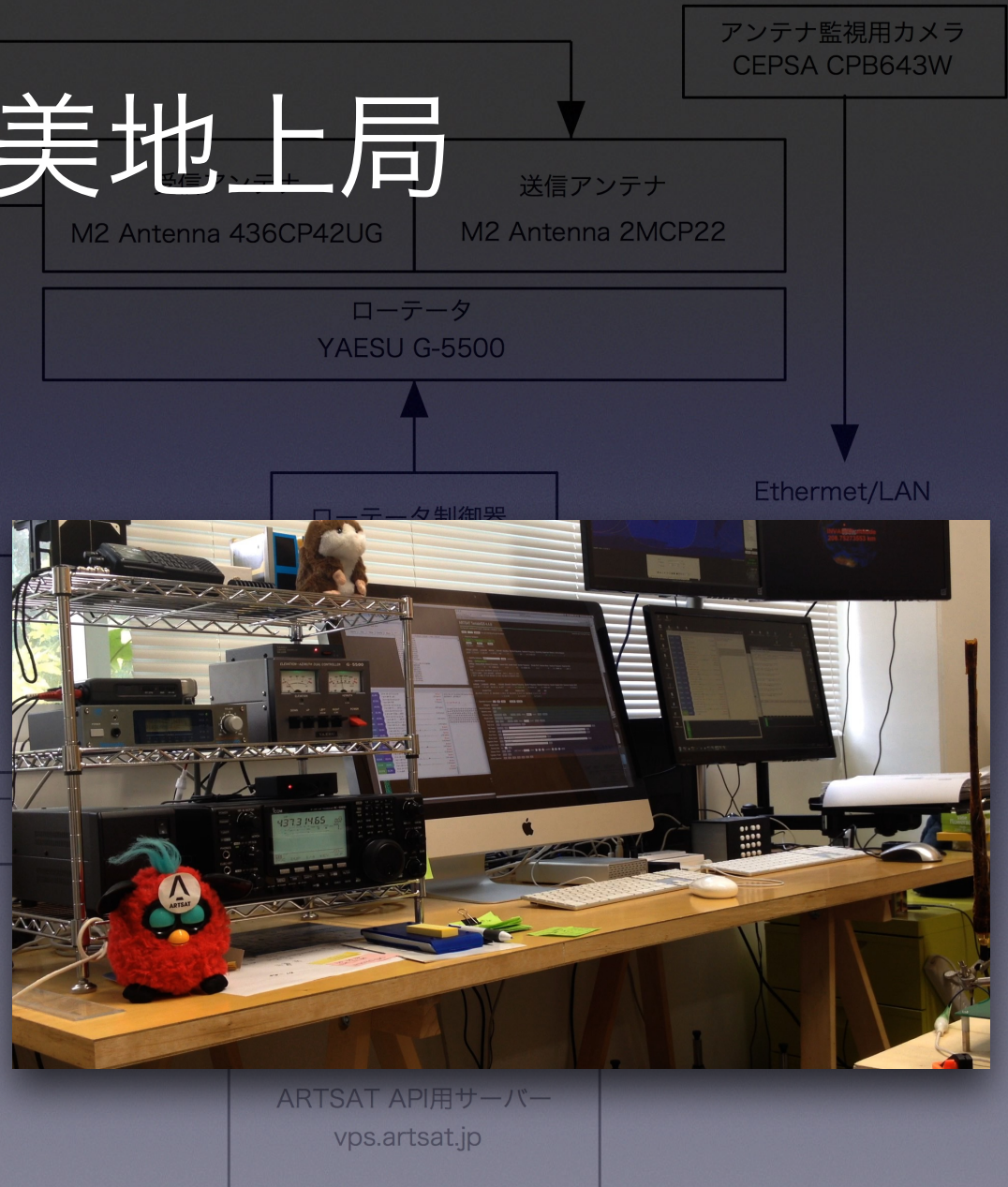
多摩美地上局

- 東京都八王子市にある
多摩美術大学に設置さ
れた ARTSAT プロ
ジェクトの地上局

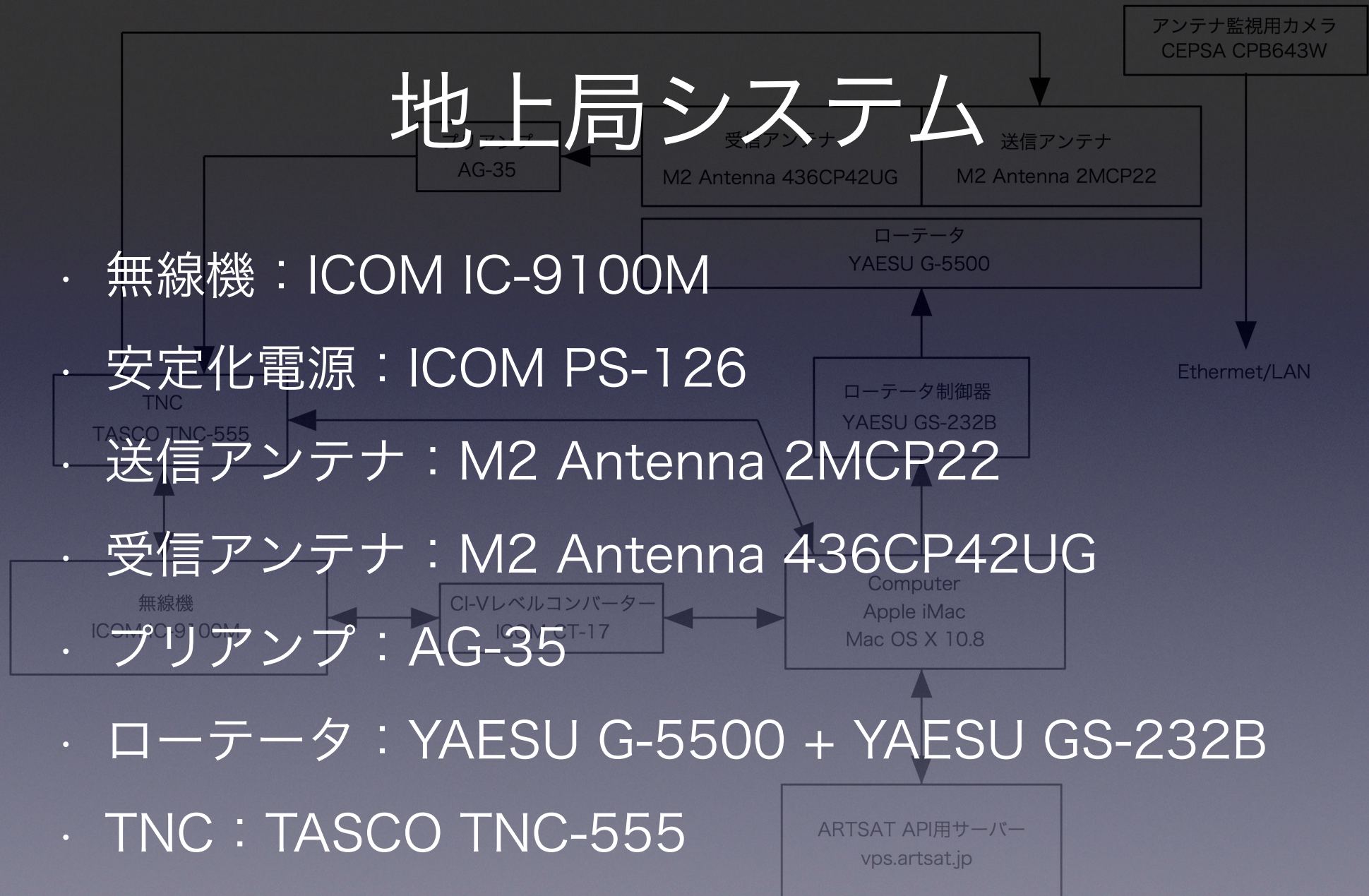
- INVADER 衛星と
DESPATCH 宇宙機の
運用を行なった

- 437MHz 帯アマチュ
ア無線を利用した通信

多摩美地上局ハードウェア構成図



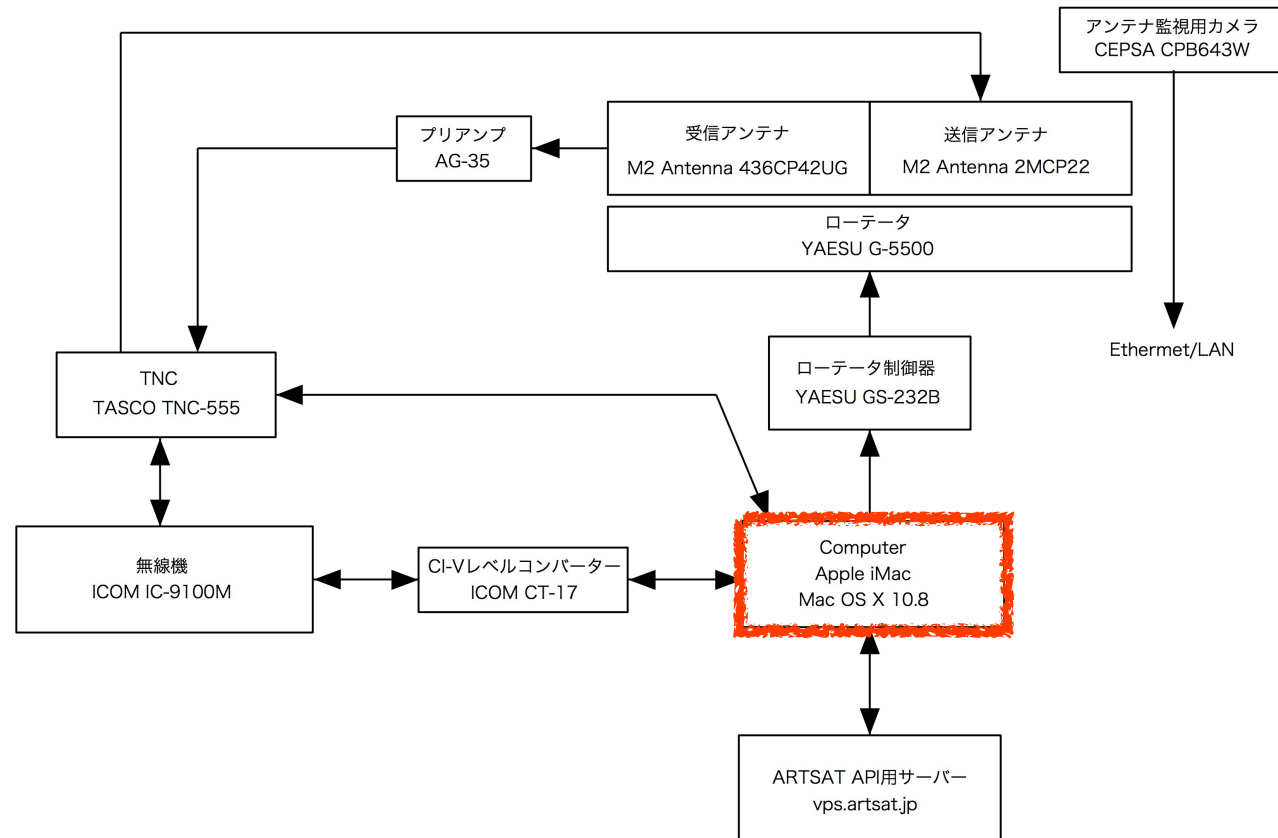
地上局システム



- ・ 無線機：ICOM IC-9100M
- ・ 安定化電源：ICOM PS-126
- ・ TNC：TASCOTNC-555
- ・ 送信アンテナ：M2 Antenna 2MCP22
- ・ 受信アンテナ：M2 Antenna 436CP42UG
- ・ プリアンプ：AG-35
- ・ CI-Vレベルコンバーター：ICOM CT-17
- ・ 無線機：ICOM IC-9100M
- ・ ロータータ：YAESU G-5500 + YAESU GS-232B
- ・ TNC：TASCOTNC-555
- ・ 統合制御：Apple iMac + MacOS X 10.9.5

多摩美地上局ハードウェア構成図

ハードウェア構成図



多摩美地上局ハードウェア構成図

artsatd

ARTSAT TamabiGS

localhost:16780

ARTSAT TamabiGS

ARTSAT TamabiGS 4.1

The first ART satellite in the world. [official site] [facebook] [twitter]

TamabiGS.app [download for Mac]

reload session exclusive You are controlling the ground station.

Observer Hardware [hide] :

Rotator Transceiver TNC

manual manual manual

[webcam] [streaming]

Callsign	Latitude	Longitude	Altitude	Azimuth	Elevation	Sender Frequency	Receiver Frequency	Supervisor Session	Online Session
JQ1ZKL	N 35.611°	E 139.351°	0.160 km	179°	0°	437.325000 MHz	437.207022 MHz	127. 0. 0. 1	2

Satellite Database [hide] : 39577

update [database]

Name	Callsign	Beacon Mode	Beacon Frequency	Beacon Drift	Sender Mode	Sender Frequency	Sender Drift	Receiver Mode	Receiver Frequency	Receiver Drift
INVADER (CO-77)	JQ1ZKK	CW	437.325000 MHz	+0 Hz	FM	437.207022 MHz	+0 Hz	FM	437.200000 MHz	-1000 Hz

TLE [Last check 2014/05/20 15:49:18 JST]

1 39577U 14009F 14139.33701450 .00104318 00000-0 67626-3 0 1243

2 39577 65.0064 141.0169 0014288 313.5222 46.4729 15.75348906 12628

Satellite Status [hide] :

Latitude	Longitude	Altitude	Azimuth	Elevation	Beacon Frequency	Sender Frequency	Receiver Frequency	Sender Doppler Shift	Receiver Doppler Shift
S 20.760°	E 147.060°	341.332 km	171.333°	-25.639°	437.333026 MHz	437.207022 MHz	437.207023 MHz	99.998165 %	100.001835 %

Current Time

2014/05/20 15:50:38 JST 2014/05/20 17:32:41 JST 2014/05/20 17:32:41 JST 2014/05/20 17:41:27 JST +18.519°

Operation Control [hide] : CW FM NOOP CW_TEST FM_TEST

Category Command

Normal Operation STA MRR

Telemetry Index PTI

Telemetry Data 0014100 PTR remove clear offset : 014100 count : 12 append

Boot Mode GRS 000 - Self Test GWA

Text Param X GRS GWA

VM Param GRS GWA

Note Param GRS d3 4 e3 4 f3 4 a3 4 b3 4 c4 4 e4 2. - 4 d3 4 e3 4 f3 4 a3 4 b3 4 c4 4 e4 2. - 4 d3 4 e3 4 f3 4 a3 4 b3 4 c4 4 e4 2. - 4 GWA

Morse Param GRS GWA

Digitaltalker Param GRS GWA

Camera Param GRS GWA

Camera Data line : GRS GWA

Mission Power MSR MSD OBC Time : 0x offset : h m s duration : h m s SMS

Digitaltalker Power DON DOF

Critical Operation AEP HDS

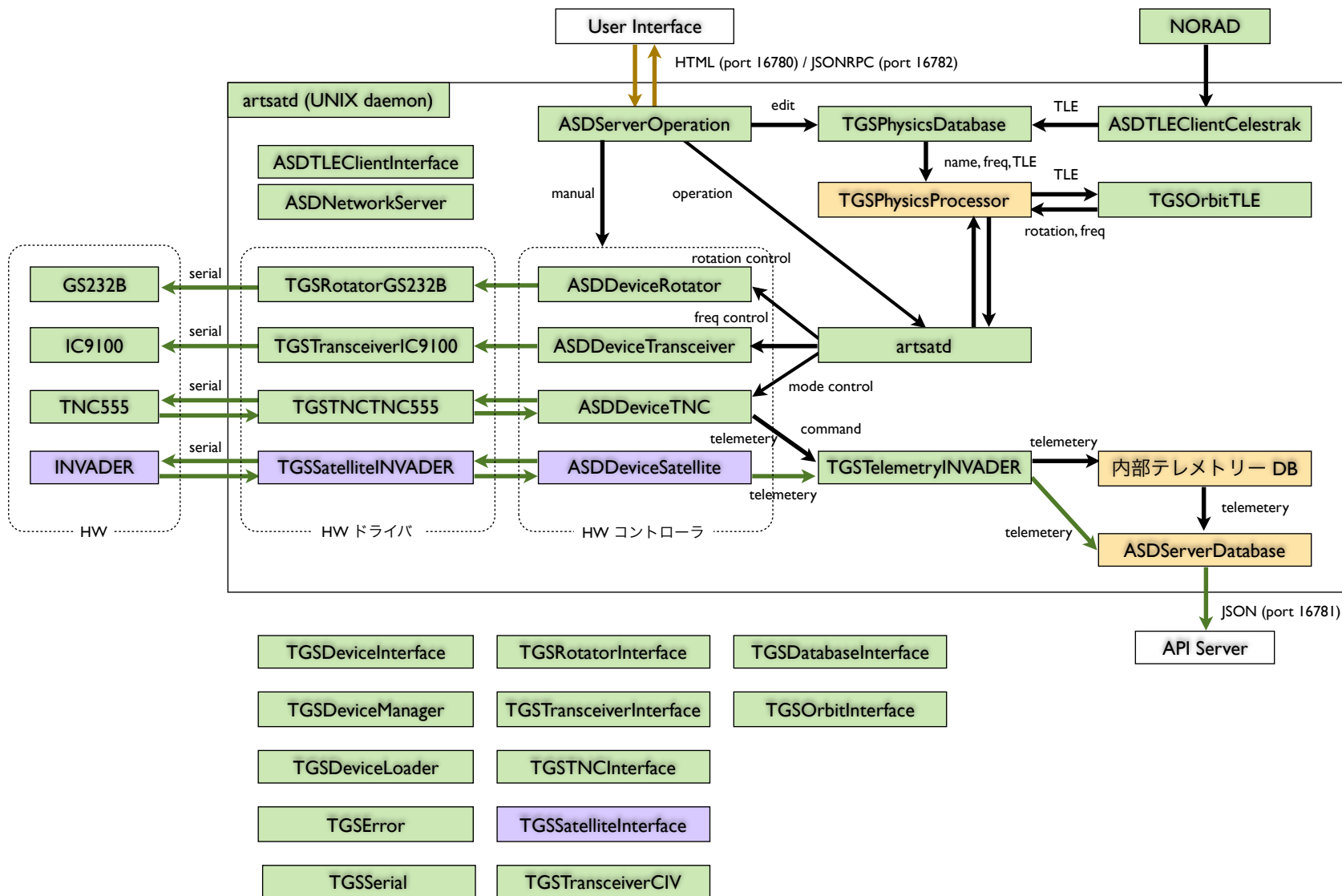
Copyright (C) 2013 - 2014 ARTSAT Project. All Rights Reserved. Written by HORIGUCHI Junichi, HASHIMOTO Ron.

reload session exclusive You are controlling the ground station.

Observer Hardware [hide] :

Rotator Transceiver TNC
manual manual manual
[webcam] [streaming]

システム構成図



You are controlling the ground station.

Observer Hardware [hide] :

[webcam] [streaming]

ユーザインターフェース

Callsign	Latitude	Longitude	Altitude	Azimuth	Elevation	Sender Frequency	Receiver Frequency	Supervisor Session	Online Session
JQ1ZKL	N 35.611°	E 139.351°	0.160 km	179°	0°	437.323000 MHz	437.207022 MHz	127, 0, 0, 1	2

Satellite Database [hide] : [database]

Name	Callsign	Beacon Mode	Altitude	Sender Frequency	Receiver Frequency	Supervisor Session	Online Session
INVADER (CO-77)	JQ1ZKK	FM	437.323000 MHz	437.207022 MHz	127, 0, 0, 1	2	

artsatd はデーモンソフトウェアであるので
GUI は存在せず、ユーザはソケット通信を介して
コントロールする

Latitude	Longitude	Altitude	Azimuth	Elevation	Beacon Frequency	Sender Frequency	Receiver Frequency	Sender Doppler Shift	Receiver Doppler Shift
S 20.760°	E 147.060°	341.332 km	171.333°	-25.639°	437.333026 MHz	437.207022 MHz	437.207022 MHz	99.998165 %	100.001835 %

Current Time	AOS	Rotation Start	LOS	MEL
2014/05/20 15:50:38 JST	2014/05/20 17:37:41 JST	2014/05/20 17:37:41 JST	2014/05/20 17:41:27 JST	2014/05/20 18:19:19 JST

- HTTP (port 16780) と JSONRPC (port 16782) を待ち受ける

Operation Control [hide] :

Category	Command
Normal Operation	<input type="button" value="STA"/> <input type="button" value="MRR"/>
Telemetry Index	<input type="button" value="PTI"/>
Telemetry Data	<input type="text" value="0014100"/> <input type="button" value="PTR"/> <input type="button" value="remove"/> <input type="button" value="clear"/> <input type="text" value="offset : 014100"/> <input type="text" value="count : 12"/> <input type="button" value="append"/>
Boot Mode	<input type="button" value="GRS"/> <input type="button" value="GWA"/>
Text Param	<input type="text" value="X"/> <input type="button" value="GRS"/> <input type="button" value="GWA"/>
VM Param	<input type="text" value="GRS"/> <input type="button" value="GWA"/>
Note Param	<input type="text" value="GRS"/> <input type="button" value="GWA"/>
Morse Param	<input type="text" value="GRS"/> <input type="button" value="GWA"/>
Digitaltalker Param	<input type="text" value="GRS"/> <input type="button" value="GWA"/>
Camera Param	<input type="text" value="GRS"/> <input type="button" value="GWA"/>
Camera Data	<input type="text" value="line :"/> <input type="button" value="GRS"/>
Mission Power	<input type="button" value="MSR"/> <input type="button" value="MSD"/> <input type="text" value="OBC Time : 0x"/> <input type="text" value="offset :"/> <input type="text" value="h"/> <input type="text" value="m"/> <input type="text" value="s"/> <input type="text" value="duration :"/> <input type="text" value="h"/> <input type="text" value="m"/> <input type="text" value="s"/> <input type="button" value="SMS"/>

デフォルトインターフェース

ARTSAT TamabiGS 5.1.0

The first ART satellite in the world. [official site] [facebook] [twitter]

TamabiGS

reload session exclusive You are controlling the ground station.

[-] Observer Hardware:

Rotator Transceiver TNC

manual manual manual

[webcam] [streaming]

Callsign	Latitude	Longitude	Altitude	Azimuth	Elevation	Sender Frequency	Receiver Frequency	Recording	Supervisor Session	Online Session
JQ1ZKL	N 35.611°	E 139.351°	0.160 km	188°	1°	- MHz	436.857178 MHz		127. 0. 0. 1	2

[-] Spacecraft Database: 27848 update [database]

Name CUBESAT XI-IV (CO-57)

Callsign	Beacon Mode	Beacon Frequency	Beacon Drift	Sender Mode	Sender Frequency	Sender Drift	Receiver Mode	Receiver Frequency	Receiver Drift
JQ1YCW	CW	436.849000 MHz	-1000 Hz	FM	- MHz	+0 Hz	FM	437.493000 MHz	+0 Hz

TLE [Last check 2015/02/09 17:50:50 JST]

1	27848U	03031J	15038.84559294	.00000290	00000-0	15304-3	0	9996	
2	27848	98.7074	49.0555	0008751	326.2399	155.5139	14.21367054601974		

[-] Spacecraft Status:

Latitude	Longitude	Altitude	Azimuth	Elevation	Beacon Frequency	Sender Frequency	Receiver Frequency	Sender Doppler Shift	Receiver Doppler Shift
N 10.017°	E 135.803°	818.715 km	188.088°	+1.927°	436.857175 MHz	- MHz	437.502189 MHz	99.997900 %	100.002100 %
Current Time			AOS		Rotation Start		LOS	MEL	
2015/02/09 17:56:18 JST			2015/02/09 17:55:48 JST		2015/02/09 17:55:48 JST		2015/02/09 18:10:37 JST	+36.709°	
			Δ -00:00:30		Δ -00:00:30		Δ 00:14:19		

[-] Operation Control: CW FM NOOP CW_TEST FM_TEST

Category	Command
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You are controlling the ground station.

Observer Hardware [hide] :

[webcam] [streaming]

ハードウェア情報画面

Callsign	Latitude	Longitude	Altitude	Azimuth	Elevation	Sender Frequency	Receiver Frequency	Supervisor Session	Online Session
JQ1ZKL	N 35.611°	E 139.351°	0.160 km	179°	0°	436.857025 MHz	437.207022 MHz	127. 0. 0. 1	2

Satellite Database [hide] : 39577 [database]

Name **INVADER (CO-77)**

Callsign

JQ1ZKL

TLE

1 39577

2 39577

Satellite

Latitude

S 20.000°

2014/1

Operat

[-] Observer Hardware:

Rotator

[webcam]

Transceiver

[streaming]

TNC

Callsign	Latitude	Longitude	Altitude	Azimuth	Elevation	Sender Frequency
JQ1ZKL	N 35.611°	E 139.351°	0.160 km	190°	5°	- MHz

Receiver Frequency	Recording	Supervisor Session	Online Session
436.857025 MHz		127. 0. 0. 1	2

Category	Command
Normal Operation	<input type="button" value="STA"/> <input type="button" value="MRR"/>
Telemetry Index	<input type="button" value="PTI"/>
Telemetry Data	<input type="text" value="0014100"/> <input type="button" value="PTR"/>
Boot Mode	<input type="button" value="GRS"/> 000 - Self Test
Text Param	<input type="text" value="X"/> <input type="button" value="GRS"/>
VM Param	<input type="button" value="GRS"/>
Note Param	<input type="button" value="GRS"/> d3 4 e3 4 f3 4 f#3 4 a3
Morse Param	<input type="button" value="GRS"/> <input type="button" value="GWA"/>
Digitalker Param	<input type="button" value="GRS"/> <input type="button" value="GWA"/>
Camera Param	<input type="button" value="GRS"/> <input type="button" value="GWA"/>
Camera Data	line : <input type="button" value="GRS"/>
Mission Power	<input type="button" value="MSR"/> <input type="button" value="MSD"/> OBC Time : 0x <input type="text"/> offset : <input type="text"/> h <input type="text"/> m <input type="text"/> s duration : <input type="text"/> h <input type="text"/> m <input type="text"/> s <input type="button" value="SMS"/>

You are controlling the ground station.

Observer Hardware [hide] :

宇宙機データベース画面

Callsign	Latitude	Longitude	Altitude	Azimuth	Elevation	Sender Frequency	Receiver Frequency	Supervisor Session	Online Session
JQ1ZKL	N 35.611°	E 139.351°	0.160 km	179°	0°	437.207022 MHz	437.207022 MHz	127, 0, 0, 1	2

Satellite Database [hide] : [database]Name [-] Spacecraft Database: [database]Name **CUBESAT XI-IV (CO-57)**

Callsign	Beacon Mode	Beacon Frequency	Beacon Drift	Sender Mode	Sender Frequency
JQ1YCW	CW	436.849000 MHz	-1000 Hz	FM	- MHz

TLE [Last check 2015/02/09 17:50:50 JST]

1	27848U	03031J	15038.84559294	.00000290	00000-0	15304-3	0	9996
2	27848	98.7074	49.0555	0008751	326.2399	155.5139	14.21367054601974	

Operation Control [hide] :

Sender Drift	Receiver Mode	Receiver Frequency	Receiver Drift
+0 Hz	FM	437.493000 MHz	+0 Hz

Category	Command
Normal Operation	<input type="button" value="STA"/> <input type="button" value="MRR"/>
Telemetry Index	<input type="button" value="PTI"/>
Telemetry Data	<input type="text" value="0014100"/> <input type="button" value="PTR"/> <input type="button" value="remove"/> <input type="button" value="clear"/>
Boot Mode	<input type="button" value="GRS"/> <input type="text" value="000 - Self Test"/> <input type="button" value="GWA"/>
Text Param	<input type="text" value="X"/> <input type="button" value="GRS"/>
VM Param	<input type="button" value="GRS"/>
Note Param	<input type="button" value="GRS"/> <input type="text" value="d3 4 e3 4 f3 4 f#3 4 a3 4 b3 4 c4 4 c#4 4 e4"/>
Morse Param	<input type="button" value="GRS"/> <input type="button" value="GWA"/>
Digitalker Param	<input type="button" value="GRS"/> <input type="button" value="GWA"/>
Camera Param	<input type="button" value="GRS"/> <input type="button" value="GWA"/>
Camera Data	line : <input type="button" value="GRS"/>
Mission Power	<input type="button" value="MSR"/> <input type="button" value="MSD"/> OBC Time : 0x <input type="text" value=""/> offset : <input type="text" value=""/> h <input type="text" value=""/> m <input type="text" value=""/> s duration : <input type="text" value=""/> h <input type="text" value=""/> m <input type="text" value=""/> s <input type="button" value="SMS"/>

You are controlling the ground station.

Observer Hardware [hide] :

[webcam] [streaming]

宇宙機ステータス画面

Callsign	Latitude	Longitude	Altitude	Azimuth	Elevation	Sender Frequency	Receiver Frequency	Supervisor Session	Online Session
JQ1ZKL	N 35.611°	E 139.351°	0.160 km	179°	0°	437.502077 MHz	437.207022 MHz	127, 0, 0, 1	2

Satellite Database [hide] : [database]

Name **INVADER (CO-77)**

Callsign	Beacon Mode	Beacon Frequency	Beacon Drift	Sender Mode	Sender Frequency	Sender Drift	Receiver Mode	Receiver Frequency	Receiver Drift
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JQ1ZKL

[-] Spacecraft Status:

Latitude	Longitude	Altitude	Azimuth	Elevation	Beacon Frequency	Sender Frequency	Receiver Frequency
N 12.138°	E 135.317°	818.877 km	189.875°	+4.198°	436.857063 MHz		- MHz

Current Time	AOS	Rotation Start	LOS
2015/02/09 17:56:54 JST	2015/02/09 17:55:48 JST	2015/02/09 17:55:48 JST	2015/02/09 18:10:37 JST
	Δ -00:01:06	Δ -00:01:06	Δ 00:13:43

Operation Control [hide] :

Category	Command
Normal Operation	<input type="button" value="STA"/> <input type="button" value="MRR"/>
Telemetry Index	<input type="button" value="PTI"/>
Telemetry Data	<input type="text" value="0014100"/> <input type="button" value="PTR"/> <input type="button" value="remove"/> <input type="button" value="clear"/> <input type="button" value="offset"/>
Boot Mode	<input type="button" value="GRS"/> <input type="text" value="000 - Self Test"/> <input type="button" value="GWA"/>
Text Param	<input type="text" value="X"/> <input type="button" value="GRS"/> <input type="button" value="GWA"/>
VM Param	<input type="button" value="GRS"/> <input type="button" value="GWA"/>
Note Param	<input type="button" value="GRS"/> <input type="text" value="d3 4 e3 4 f3 4 f#3 4 a3 4 b3 4 c4 4 c#4 4 e4 2. - 4 d3 4 e3 4 f3 4 f#3 4 a3 4 b3 4 c4 4 c#4 4 d4 2. - 4 d3 4 e3 4 f3 4 g3 4 a3 4 b3 4 c4 4 c#4 4 e4 2. - 4"/> <input type="button" value="GWA"/>
Morse Param	<input type="button" value="GRS"/> <input type="button" value="GWA"/>
Digitalker Param	<input type="button" value="GRS"/> <input type="button" value="GWA"/>
Camera Param	<input type="button" value="GRS"/> <input type="button" value="GWA"/>
Camera Data	line : <input type="button" value="GRS"/>
Mission Power	<input type="button" value="MSR"/> <input type="button" value="MSD"/> <input type="text" value="OBC Time : 0x"/> <input type="text" value="offset :"/> h <input type="text" value="m"/> s duration : <input type="text" value="h"/> h <input type="text" value="m"/> m <input type="text" value="s"/> s <input type="button" value="SMS"/>

Receiver Frequency	Sender Doppler Shift	Receiver Doppler Shift
437.502077 MHz	99.997925 %	100.002075 %

LOS	MEL
JST +36.709°	
Δ 00:13:43	

• HTTP が利用できれば良いので localhost でも

任意の IP アドレス上でも問題なくアクセス可能

・地上局の外部から地上局システムを制御することができる

・セキュリティの必要な制御は localhost からのアクセスのみを許可（外部からは SSH ポートフォワードに任せる）

You are controlling the ground station.

Observer Hardware [hide] :

[webcam] [streaming]

同時アクセス

Callsign	Latitude	Longitude	Altitude	Azimuth	Elevation	Sender Frequency	Receiver Frequency	Supervisor Session	Online Session
JQ1ZKL	N 35.611°	E 139.351°	0.160 km	179°	0°	437.325000 MHz	437.207022 MHz	127, 0, 0, 1	2

Satellite Database [hide] : 39577 [database]

• セッション情報を発行し複数人での同時アクセスを許可

Name	Beacon Mode	Beacon Frequency	Beacon Power	Beacon Frequency	Beacon Power	Receiver Mode	Receiver Frequency	Receiver Drift
JQ1ZKK	CW	437.325000 MHz	+0 Hz	FM	437.207022 MHz	FM	437.200000 MHz	-1000 Hz

Satellite Status [hide] :

• 情報を閲覧するだけのユーザは設定された最大セッション数までは何人でも許可

Operation Control [hide] :

• ハードウェアのコントロールは常に1つのセッションからのみアクセス可能

Category Command
Normal Operation
Telemetry Index
Telemetry Data

This document is provided by JAXA.

You are controlling the ground station.

Observer Hardware [hide] :

[webcam] [streaming]

軌道の計算と追尾

Callsign	Latitude	Longitude	Altitude	Azimuth	Elevation	Sender Frequency	Receiver Frequency	Supervisor Session	Online Session
JQ1ZKL	N 35.611°	E 139.351°	0.160 km	179°	0°	437.207022 MHz	437.207022 MHz	127, 0, 0, 1	2

Satellite Database [hide] : [database]

• 一定時間毎にデータベースから軌道情報を読み出し軌道を計算

Name	Beacon Mode	Beacon Frequency	Beacon Drift	Sender Mode	Sender Frequency	Sender Drift	Receiver Frequency	Receiver Drift
JQ1ZKK	CW	437.325000 MHz	+0 Hz	FM	437.200000 MHz	+0 Hz	437.200000 MHz	-1000 Hz

Satellite Status [hide] :

• TLE に関しては cppOrbitTools を使い SGP4/SDP4 アルゴリズムを使用

Operation Control [hide] :

• SCD に関しては SCTracker を使い初期値から積分を行う

Category: Normal Operation
Telemetry Index:
Telemetry Data: offset : count :
Boot Mode:
Text Param:
VM Param:
Note Param:
Morse Param:
Digitalker Param:
Camera Param:
Camera Data: line :

Mission Power: OBC Time : 0x duration :

Observer Hardware [hide] :

Callsign	Latitude	Longitude	Altitude	Azimuth	Elevation	Sender Frequency	Receiver Frequency	Supervisor	Session	Online Session		
JQ1ZKL	N 35.611°	E 139.351°	0.160 km	179°	0°	144.0000 MHz	437.207022 MHz	127.	0.	0.	1	2

artsatd はオープンソース

```
1 39577U 14009F 14139.33701450 .00104318 00000-0 67626-3 0 1243
```

- ・ ソフトウェアの各種要素が細かくコンポーネン

ト化された設計のため、新しいハードウェアや

軌道形式などにも柔軟に対応可能

Category	Command
----------	---------

JavaScript などから artsatd の JSONRPC インタフェース

Telemetry Data 0014100 PTR remove clear offset : 014100 count : 12 append

インターフェースにアクセスすることにより動的な

VM Param GWS

Note Param

フエフ、フヒも木軟に延

Digitized by Google

Signature	Print Name	Signature	Print Name

Camilla Parani	GRS	
----------------	-----	--

Camera Data line : GRS

This document is provided by JAXA.

You are controlling the ground station.

Observer Hardware [hide] :

[webcam] [streaming]

IoT (JSONRPC の利用)

Callsign	Latitude	Longitude	Altitude	Azimuth	Elevation	Sender Frequency	Receiver Frequency	Supervisor Session	Online Session
JQ1ZKL	N 35.611°	E 139.351°	0.160 km	179°	0°	127.000 MHz	437.207022 MHz	127.0.0.1	2

Satellite Database [hide] : 39577 [database]

Name **INVADER**
Callsign Beacon 共同開発!
JQ1ZKK
TLE [Last checked]
1 39577U 14009F
2 39577 65.0064
サイン!!

Satellite Status [hide]

Latitude Longitude
S 20.760° E 147.000°
Current
2014/05/20 15:50:30

Operation Control [hide]

Category
Normal Operation
Telemetry Index
Telemetry Data
Boot Mode
Text Param
VM Param
Note Param
Morse Param
Digitalker Param
Camera Param
Camera Data
Mission Power



The background features a large, stylized logo for ARTSAT. It consists of a large, dark blue 'A' shape formed by two long, thin, downward-pointing chevrons. Below the 'A' is a smaller, solid dark blue trapezoid. At the bottom of the image, the word 'ARTSAT' is written in a large, bold, dark blue sans-serif font.

http://github.com/ARTSAT/ground_station