Company Overview and Visualyse Products

Presented by: John Pahl Director

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Visualyse

Presentation Overview



- Transfinite Systems Ltd
- Visualyse Products:
 - Visualyse Professional
 - Visualyse Interplanetary
 - Visualyse GSO
 - Visualyse Coordinate
 - Visualyse EPFD
 - PFD Mask Generation Tool
- Summary: Why Visualyse Products



www.transfinite.com

Transfinite Systems Ltd

- UK based independent SME, founded in 1994
- Core focus of company:
 - Provision of software tools and services to analyse compatibility between radiocommunications systems
- Key Strengths:
 - Aim to be best at:
 - The tools, methodologies, and analysis techniques that are applicable to interference analysis, coordination and spectrum management
 - Combine with:
 - Wider understanding of the regulatory environment, needs of spectrum managers and spectrum users
 - Reputation and contacts built up over 25 years including UK regulator Ofcom and ITU in Geneva
 - Leading experts in field:
 - Consultants have written books and many papers





INTERFERENCE ANALYSIS

MODELLING RADIO SYSTEMS FOR SPECTRUM MANAGEMENT



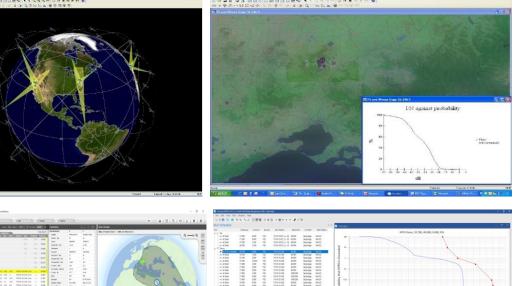


Visualyse Product Range

- Transfinite Systems Ltd develop and market range of Commercial Off The Shelf (COTS) software products:
 - Visualyse Professional a generic study tool to undertake interference analysis between a wide range of radio services including terrestrial and satellite
 - Additional Modules: Define Variable, Terrain and Traffic
 - Visualyse Interplanetary a version of Visualyse Professional with enhanced geometric framework to support analysis around the Moon, Mars and other celestial bodies
 - Visualyse GSO to support coordination trigger analysis for GSO and non-GSO satellite networks and detailed coordination for GSO satellites
 - Visualyse Coordinate to support the coordination of satellite ES
 - Visualyse EPFD software for regulators and satellite operators to check non-GSO satellite filing meets the EPFD limits in the Radio Regulations and help non-GSO operators develop their filings
 - Extension: PFD Mask Generation Tool
- Full support including Training, Support, Maintenance etc.
- Global customer base for products widely used within fora such as ITU-R
- Also undertake consultancy services and general training





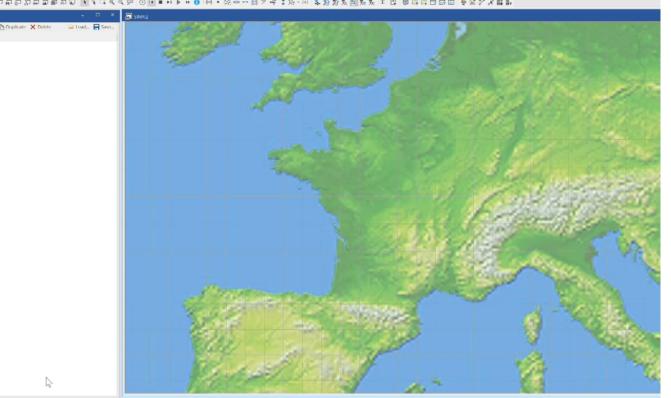


Carriers

- Flexible Study Tool for Radio Communication Systems
- Model wide range of systems, civil and military:
 - FS: P-P, P-MP, MP-MP including WiMax, FWA etc.
 - BS: DAB, DVB, DBV-H, Analogue etc.
 - MS: BR / PMR, 2G, 3G, 4G, 5G etc.
 - Satellite: FSS, BSS, MSS, ISLs
 - GSO, non-GSO, HEO
 - Earth, Moon, Mars etc.
 - Aeronautical & Maritime: UAVs, ESVs, ESIMs, radar etc.
 - Science: Radio Astronomy, Meteorological, remote sensing etc.
- Calculates signal strength for wanted and interfering systems:
 - C, I, C/I, C/N, C/(N+I), I/N, PFD, EPFD
 - Availability and throughput statistics
 - Co-frequency and non-co-frequency
 - Single entry and aggregate interference
- Wide range of modelling methodologies:
 - Static, Input-variation, Area, Dynamic, Monte Carlo etc.





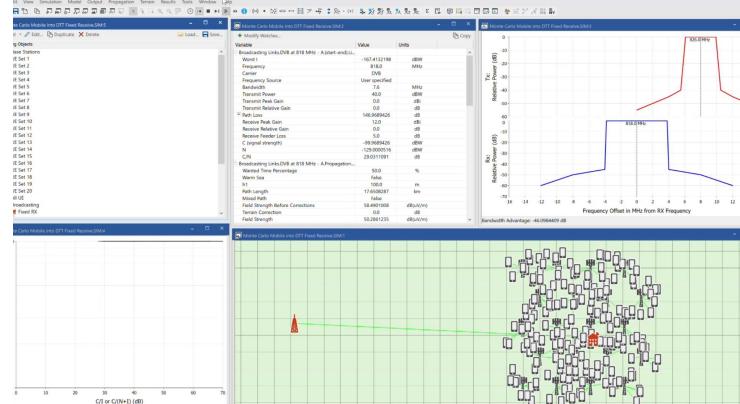


Import from ITU's Terrestrial IFIC PtP Fixed Links Propagation models = P.525, P.530, P.452

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Mobile into terrestrial DVB receiver

Non-co-frequency scenario with calculation of NFD

Monte Carlo modelling using Define Variable Module

Antenna

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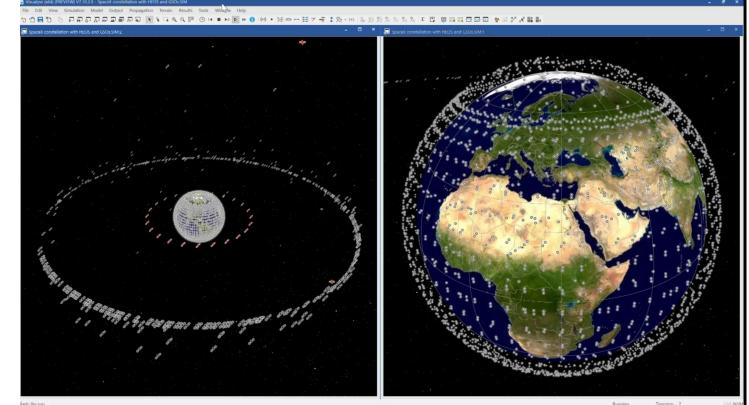
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Import 5G systems using text files Monte Carlo modelling using Define Variable Module Lidar data used with P.2001 propagation model

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SpaceX full constellation made from multiple sub-constellations in LEO O3B in MEO Geostationary satellites from TLE import HEO systems in 24 hour orbit

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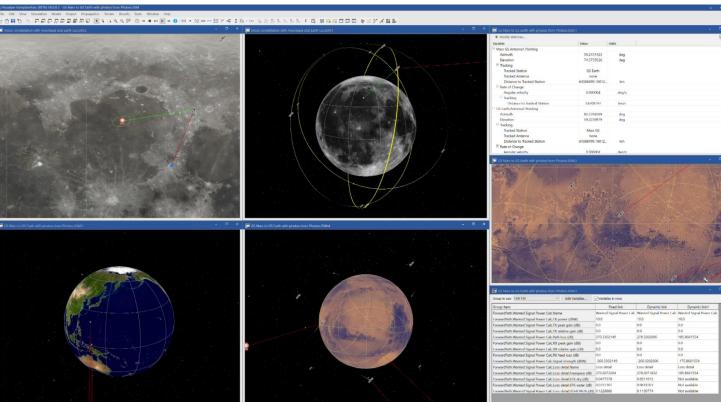
TRANSFINITE

Wide range of modelling methodologies:

SYSTEMS

Static, Input-variation, Area, Dynamic, Monte Carlo etc.



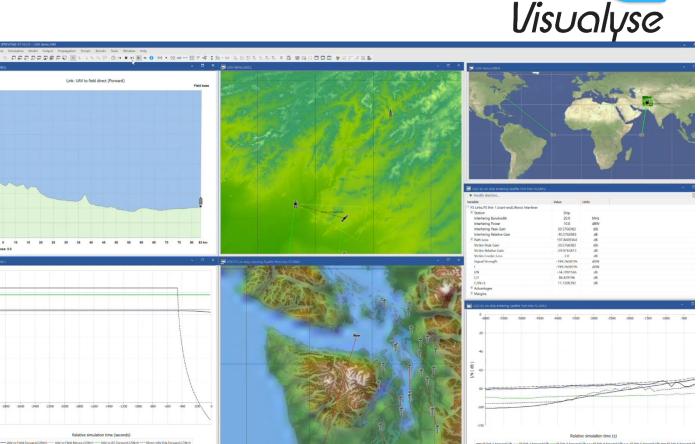


Visualyse Interplanetary

Missions around the Moon and Mars communicating with Earth Constellations around Moon communicating with Lunar surface

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UAV on flight path with ground and satellite links Earth station on vessel entering port interfering with fixed links Waypoints set using Define Variable



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- Wide range of modelling methodologies:
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EESS sensor with pointing using Define Variable Area Analysis calculating protection zone around a sensitive site

Visualyse Professional How it Works

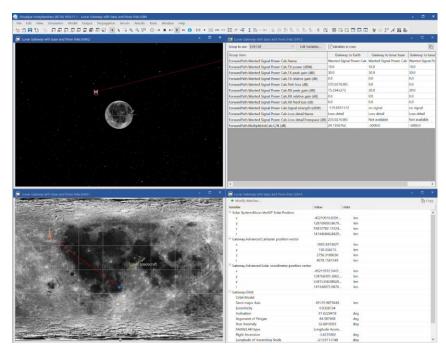
- Powerful object model:
 - Antenna Types
 - Stations
 - Carriers
 - Propagation environments
 - Tracking strategies
 - Links
 - Interference Paths
 - Traffic
 - Define Variable
- Libraries of core algorithms:
 - Station dynamics
 - Antenna pointing methods
 - Propagation models
 - Gain patterns
 - Station selection rules
 - Etc.



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/	Antennas	•		
9	Stations	•		
9	Station Groups	•		
(Carrier			
l	Links	•		
l	Link Groups	•		
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[Define Variable	•		
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.	(••) BS 5G three bear	ms		
] [Carriers			
÷	📼 Wideband 60 M	Hz		
.)	Variable Definition			
	<pre>{x} Monte Carlo:All i</pre>	in group: UEs		
	User Defined Statist	ics		
	Σ Collect statistics	for Link to UE-1 (start-end) Wanted Signal Power Calc TX peak gain		
	Σ Collect statistics	for Link to UE-1 (end-start) Wanted Signal Power Calc TX power		
	Σ Collect statistics	for UEs links Link to UE-1 (start-end) Link Calculation Path Loss IMT Patl	Loss Mode	als



Visualyse Professional Versions



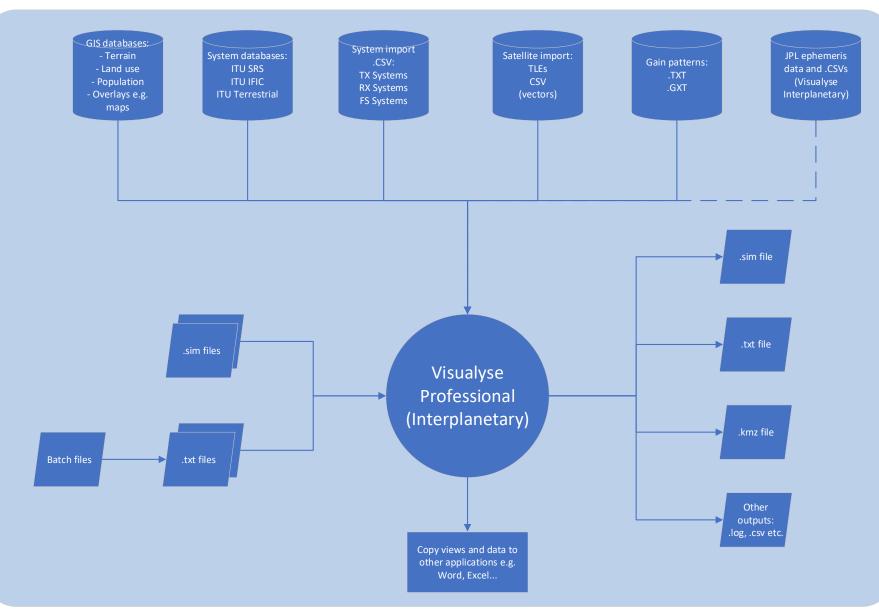


time:

Version:	Visualyse Professional	Visualyse Interplanetary		
Earth model:	Spherical	Ellipsoidal		
Includes nutation etc.:	No	Yes		
Coordinate system:	Earth Centred Inertial (ECI)	J2000.0 vectors		
Celestial bodies:	Earth only	Solar system		
Includes Doppler:	No	Yes		
Orbit models:	Point mass, point mass plus J2	Point mass, point mass plus J2, SGP4/SDP4, vector import		
Point at astronomical object:	No	Yes		
Julian dates and dynamic	No	Yes		

Visualyse

Interfaces: Files and Databases



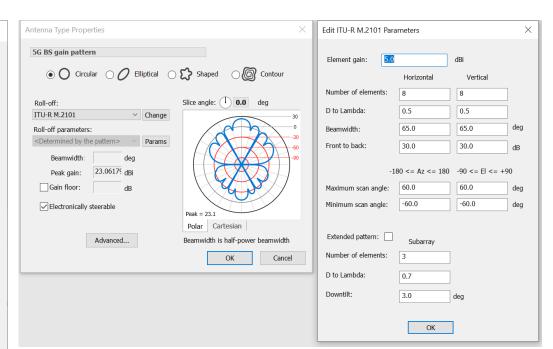


Visualyse Professional Libraries and Update Process

- The industry is always changing
- We intend to remain the leading tool for radiocommunication studies
- We keep track of work within industry bodies and international regulatory organisations (ITU, CEPT, 3GPP etc.)
- Frequently update propagation models and gain patterns
- Additional features included as part of continual update process
- Covered by the Visualyse Annual Maintenance and Support(AMS) contract



Х Propagation Model Selection Propagation Models ITU-R Rec. P.525 basic transmission loss in free space ✓ ITU-R Rec. P.452 propagation model for terrestrial interference analysis ITU-R Rec. P.526 propagation loss due to diffraction over terrain ITU-R Rec. P.528 propagation for aeronautical mobile in VHF/UHF/SHF bands ITU-R Rec. P.530 multipath model used in design of terrestrial links ITU-R Rec. P.1546 propagation model for terrestrial services ITU-R Rec. P.1791 propagation model for ultra-wideband applications ITU-R Rec. P.1812 propagation model for point-to-area services in VHF/UHF bands ITU-R Rec. P.2001 general purpose terrestrial propagation model (20 MHz-50 GHz) ITU-R Rec. P.2108 prediction of Clutter Loss (30 MHz - 100 GHz) ITU-R Rec. P.2109 prediction of Building Entry Loss (80 MHz - 100 Longley-Rice propagation model for point-to-point services (20 MHz-40 GHz) ITU App. S7 Mode 1 (WRC 95) great circle path loss ITU App. S7 Mode 2 (WRC 95) rain scatter loss ITU App. S7 1&2 (WRC 95) great circle and rainscatter loss Egli for terrestrial mobile at 900MHz Hata/COST 231 for terrestrial mobile up to 2GHz for point to area model applicable at 900MHz Lee TTA Bulletin 10F used in fixed service coordination Extra Losses fixed or path dependent losses IMT Path Loss Models ABG, CI/CIF, 3GPP TR 38.900/38.901, WINNER II/+, M.2135 Rain Models ITU-R Rec. P.530 rain model used in design of terrestrial links ITU-R Rec. P.618 rain model used in the design of satellite links Crane Rain Model rain attenuation model Atmospheric Losses ITU-R Rec. SF.1395 loss due to atmospheric gas for FSS into FS loss due to atmospheric gas for terrestrial and slant paths ITU-R Rec. P.676 ITU-R Rec. P.840 attenuation due to clouds and fog Dry Air attenuation through a dry atmosphere Water attenuation due to water vapour





OK Cancel

Visualyse GSO

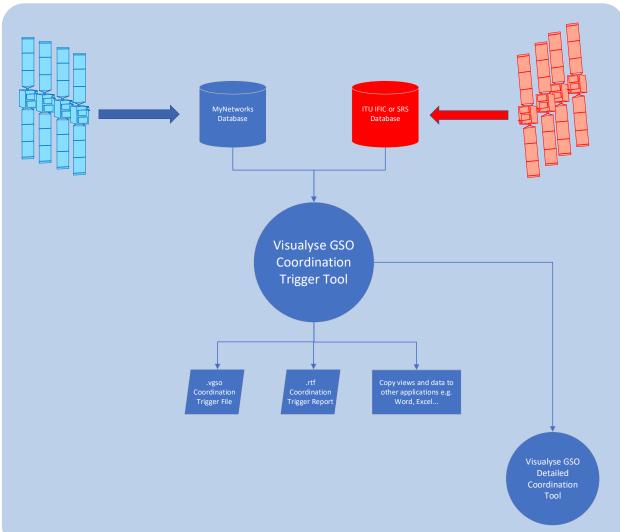
- Designed to support coordination of GSO and non-GSO satellite networks
- Key attributes
 - Ability to define My Networks
 - Both GSO networks and non-GSO systems
 - Import from SRS/IFIC or create New
 - Ability to check My Networks (both GSO and non-GSO) against ITU BR IFIC:
 - Coordination Arc
 - DT/T
 - Frequency overlap
 - Ability to undertake detailed coordination analysis for GSO-GSO scenarios
 - Ability to generate reports to support the process
- Additional tools including:
 - Priority Map
 - Slot Finder





y Networks		×
Checked items will be used in the coordination pro	cess	Select All
Network Name USGOVSAT-10 USGOVSAT-12 USGOVSAT-11R USGOVSAT-1R USGOVSAT-20R USGOVSAT-3R USGOVSAT-6R USGOVSAT-6R USGOVSAT-8 IMPROSAT TSLSAT-1A	IFIC Ref. 2814 2814 2855 2859 2851 2843 2824 2815 - -	
Import Export + Add	🖌 Edit 🕒 Duplicate	× Delete
		Close

Visualyse GSO Coordination Trigger



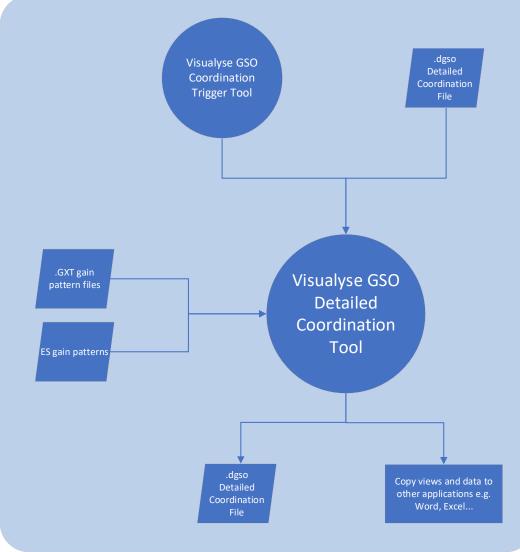
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553.1100		_		Vehicles with Torkiski 422-6		torbini cases 210 beam overlaps	RKUW of TURKSAT-42F-B → K		
		33.0" KYPROS-SATLA	ର -୦ ଉ	V ASVICTIN	1K % Separation = 3.0 deg		KRUW OF TURNSAT-42E-6 -> N		<u> </u>
		33.0" KYPROS-SATC						-	
11				▶ ! Uplink (14.000750 - 14.249000)	1K % (++) Inside Coordination Arc	4 beam pairs Detailed Coordination	1		
358.0° CHINEWSAT-G1-20 TDRS 12W 358.0° CHINEWSAT-G1-20		IT ESATS (10" TURKSAT-42E-B 4.0" CHINNEWSA G1-34E (52.5" E	GLO' INTELSATE GRE MARSAT-SG GLO' CHN	Uplink (14.250750 - 14.499825)	1K % (++) Inside Coordination Arc	4 beam pairs Detailed Coordination			- 1
TDRS 12W 358.2" BIFROST 4.8W-20	9843	4.0° IRANSAT BI KE (46.0° MEASAT 46E R	GLO' YAHSATGLE	Uplink (13.750175 · 13.999000)	382.43 % (++) Inside Coordination Arc	4 beam pairs Detailed Coordination			
		4.0° IRANSAT-B <mark>-</mark> 4E 45.9° MEA SAT-46E-R 4.0° CHNNEWSA 61-34E 52.5° E		Downlink (10.950750 - 11.199000)	156.5 % (++) Inside Coordination Arc	6 beam pairs Detailed Coordination			
	TLU ANDESALUSTIE	33.0° K PROS-SAT-5	MARSATISG 68.0° CHN	Downlink (11.450750 - 11.699000)	143.15 % (++) Inside Coordination Arc	6 beam pairs Detailed Coordination			
		(0.0 DPRESS-IB	63.0" YAHSAT-63E	Downlink (12.500750 - 12.749000)	120.16 % (++) Inside Coordination Arc	6 beam pairs Detailed Coordination		CHAR IN	
		40.6" CHNNEWSAT-G1-40E	63.0" YAHSAT-63E	V AS INTERFERER	25K %			DY 2 M	
100 11 1				Uplink (13.750175 - 13.999000)	25K % (++) Inside Coordination Arc	4 beam pairs Detailed Coordination		ACT IN	
and the structure of the black of the structure of the st	Curtation		Cost by Davidson	Uplink (14.250750 - 14.499825)		4 beam pairs Detailed Coordination		V AV	
erence direction(s) My Networks <- n ☑ Inside Arc (++) 0r ∨ ☑			Sort by Ranking ~	Uplink (14.000750 - 14.249000)	8K % (++) Inside Coordination Arc	4 beam pairs Detailed Coordination			
				Downlink (10.950750 - 11.199000)	1K % (++) Inside Coordination Arc	6 beam pairs Detailed Coordination			
(Fail) (GSU) (NGSU) (No Geog	raphic Overlap) (No Frequency Overlap)			Downlink (11.450750 - 11.699000)	1K % (++) Inside Coordination Arc	6 beam pairs Detailed Coordination			
YPROS-SAT-5 CYP	(++) Wost DT/T ≤ 211M %	10/04/11 NTE		Downlink (12.500750 - 12.749000)	434.95 % (++) Inside Coordination Arc	6 beam pairs Detailed Coordination			
CHNNEWSAT-G1-40E CHN	(++) Worst DT/T ≤2M %	30/11/17 CR		V KYPROS-SAT-L4	670.78 % Separation = 3.0 deg				
EXPRESS-4B RUS	(++) Work DT/T < 1M %	22/10/99 NTF		V AS VICTIM	670.78 %				
				▶ ! Uplink (14.027000 - 14.145000)	670.78 % (++) Inside Coordination Arc	8 beam pairs Detailed Coordination	Included based on beam of	verlap	
EXPRESS-4B RUS	(++) Worst DT/T ≤ 1M %	22/10/99 NTE		▶ Uplink (14.182900 - 14.213100)	656.66 % (++) Inside Coordination Arc	6 beam pairs Detailed Coordination	Coordination Trigger		
IEASAT-46E-R MLA	(↔) Worst DT/T < 51K %	120407 NTF		▶ Uplink (14.277000 - 14.395000)	647.49 % (++) Inside Coordination Arc	6 beam pairs Detailed Coordination			
IEASAT-46E-R MLA	(++) Worst DT/T ≤ 51K %	12/04/07 NTF		▶ Uplink (14.432900 - 14.463100)	634.1 % (++) Inside Coordination Arc	8 beam pairs Detailed Coordination	Networks Interfering Network	TURKSAT-42E-B	
HNNEWSAT-G1-34E CHN	(++) Worst DT/T ≤ 37K %	30/11/17 CR		Uplink (13.932900 - 13.963100)	213.64 % (++) Inside Coordination Arc	8 beam pairs Detailed Coordination	Administration	TUR	
HNNEWSAT-G1-44.5E CHN	(++) Worst DT/T ≤ 29K %	30/11/17 CR		Downlink (10.977000 - 11.095000)	135.69 % (++) Inside Coordination Arc	6 beam pairs Detailed Coordination	Notice ID	114500196	
URKSAT-42E-B TUR	(++) Worst DT/T ≤ 25K %	31/1207 NTF		Downlink (11.132900 - 11.163100)	132.06 % (++) Inside Coordination Arc	6 beam pairs Detailed Coordination	Notification Type	N	
URKSAT-42E-B TUR	(++) Worst DT/T ≤ 25K %	31/12/07 NTF		KYPROS-SAT-C (victim)		ର ଉ	Orbital Location BR Publication	42.00 deg E N/A	
UROPESTAR-47.5E D	Worst DT/T ≤ 14K %	04/10/08 NTF			13.751 13.867 13.99884 14.132 14	279 14.397	Dated	11 December 2018	
UROPESTAR-47.5E D	Worst DT/T ≤ 14K %	04/10/06 NTF							
RANSAT-B-34E IRN	(++) Wost DT/T < 6K %	31/12/17 CR			AAAAAAAA		Victim Network	KYPROS-SAT-C	
					13,764 13,882 14,029 14,147 14	64 14.382	Administration Notice ID	C/P 108501035	
RANSAT-B-34E IRN	(++) Worst DT/7 ≤ SK %	50.000 C			16/04/09		Notification Type	N	
MARSAT-5G UAE	Worst DT/T ≤ 1K %	310708 NTF					Orbital Location	39.00 deg E	
MARSAT-5G UAE	Worst DT/T ≤ 1K %	310706 NTE					Orbital Separation	3.0 deg	
IVSAT-78.5E MLD	Worst DT/T ≤ 1K %	25/12/17 CR			13.775 13.925 425 14.455 14	275 14,425	Overlap Frequency	14.001-14.249 GHz	
IVSAT-78.5E MLD	Worst DT/T ≤ 1K %	25/12/17 CR				VVVV	Coordination Arc Erigger Coordination Arc Exists	Yes	
NTERSPUTNIK-75E-Q RUS (N)	Worst DT/T ≤ 1K %	23/12/18 DR			14.001 14.125	14.498	Size of Arc	6.0 deg	
USANTARA-NS1-A INS	Worst DT/T < 459.58 %	28/12/17 CR		TURKSAT-42E-B (Interferer) 36M06	7W TYPICAL-KI-0M6	Show Priorities	Inside Coordination Arc	Yes	
NUSANTARA-NS1-A NS	Worst DT/T ≤ 459.56 %	28/12/17 CR					TTTTTigger		
		30/11/17 CR		-			Interfering Group		Rep

17

Designed for **both GSO and non-GSO** coordination trigger analysis Visualyse GSO Coordination Trigger Views:

- GSO arc satellite map
- Network list
- Overlaps
- Overlaps diagram
- 3D view and beam overlaps
- Coordination trigger and calculations

Visualyse GSO Detailed Coordination



IURKSAT-42E-B into KYPROS-SAT-C (downlin	k) stage 2 daro - Detaile	ed Coordination						- <i>a</i>
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(SAT-42E-B → KYPROS-SAT-C 10.9507	50 - 11.199000 GHz	Powers Max C, N	lax I OBW/1.2 🖋 Thre	shold 20.00 dB «	Calculations	ſ	A A V Copy	Beam Overlaps
DOWNLINK				Only show !	LINK BUDGETS	c	I	TKR of TURKSAT-42E-B → KTM of KYPROS-SAT-C
DOWNLINK		ADVANTAGES	Victim ES Cases Ti	reshold @ Worst C/I	v Satelite	KYPROS-SAT-C	TURKSAT-42E-B	
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V Carrier: 26M0F9W •			1/28	20.0 19.994	Polarisation	L.	м	
▶ I Carrier: 51K2G7W •			1/7	20.0 19.994		108629078	115697955	A set of the set of th
► VI Carrier: 3M00G7W •			7	20.0 20.072	Group B/W MHz Allocated B/W MHz	27	50 27	the state of the second s
					Allocated B/W MHz Occupied B/W MHz	25	2/ 22.5	
► ✓ I Carrier: 1M47G7W •				20.0 20.074	Tx Power dBW	19,6	21.7	
▼ ✓I Carrier: 27M0G7W •			7	20.0 20.160	Pwr Density dBW/Hz	-53.76	-51.82	
• ✓ 27M0G7W 43.54					⊤ Tx Gain dB	27.77	21.84	
🗄 • 🖌 27M0G7W 43.54	26M0F9W 47.37	-16.02 -0.84 -0	TYPICAL KU 0.6M, 0.5m.	. 20.0 20.687	Beam	KTM	TKR	
	26M0F9W 47.37	-16.02 -1.41 -0.03	TYPICAL KU 0.6M, 0.5m.		Boresight	N/A	N3.78 E19.99	
	26M0F9W 47.37	-16.02 -4.1 -0.04	TYPICAL KU 0.6M, 0.5m.		Radiation Pattern	From GIMS	REC-672 Ln25	
 √ 27M0G7W 43.54 √ 27M0G7W 39.75 	26M0F9W 47.37 26M0F9W 47.37	-16.02 -5.56 0.01 -16.02 -0.16 -0.01	TYPICAL KU 0.6M, 0.5m. TYPICAL KU 0.6M, 0.5m.	. 20.0 25.398 . 20.0 26.803	Bearnwidth deg	4.47	3.76	
	-	-16.02 -0.16 -0.01	TTPICAL KO 0.6M, 0.5M.	20.0 26.803	Gmax dBi	31.5	33	
SAT-42E-B KYPROS-SAT-C 🔨	¥			60	Angle deg	3.95	3.63	KTM A
Name Gain Pattern	Peak Gain (dBi)		Id: 114500196 Admin:	TUR Pos: 42.00 E	Grel dB	-3.73 47.37	-11.16	
TKR REC-672 Ln25	v 33.00				Peak Density dBW/Hz	4/.3/	43.54	
					Offaxis Density dBW/Hz	-22.26	-18.82	
MIS TEHR TK13R TKAR TKHR TKR	TKUE TKUW TX	TXR			Pathloss dB	204.58	204.61	
					v PFD dBW/m2/Hz	-188.2	-192-21	
					Spreading Loss dB	162.21	162.22	
19 GHz	1 Frequency	cy Group		22.025 GHz	Elevation Angle deg	62.91	61.57	
			e	2 - <u> </u>	⊤ Rx Gain dB	34.5	18.48	
	1				ES		KU 0.6M	
8					Location	N21.75		
10.950 - 11.700					Radiation Pattern	ITU-R S	.580-5	
= 115697955 Pol = M	Show assets for all beam	ns v			Beamwidth deg	2.92		
					Gmax dBi Angle deg	34.5	3.47	
TYP-KU-0M6	EARTH STATIONS		Name Designation	27M0G7W 27M0G7W	Grel dB	0.00	-16.02	
Typical K) 150.00	TYPICAL OM3	16KDG7W	Min Pwr (dBW)	9.10	Rx power dBW	-122.71	-142.58	ANALYSIS
e (deg) N/A	TYP-KU-0M45	19K2G7W	Max Pwr (dbw)	21.70				
e (deg) N/A	TYPICAL 0M6	- 51K2G7W	Min Density (dBW/Hz)	-65.30	INTERFERENCE			
ain (dBi) 34.90	TYP-KU-0M6	1M00G2D	Max Density (dBW/Hz)	-52.60	v I dBW Adjustments dB	-142.87 -0.29		
idth (deg) 3.20	MOBILE-0M6	1M40G7W			Bandwidth Adjustment dB			Constraints
on Pattern 29-25LOG(FI) v	TYPICAL 0M9	1M47G7W			Polarisation Loss dB	0.00		
	ТҮР-КО-ОМ9	2M00G7W			Aggregation dB	0.00		C
	TYPICAL-0M9	2M76G7W			Aggregation Factor	1		TURKSAT-42E-B (Interferer)
	MOBILE-0M9	- 3M00G7W			C dBW	-122.71		1 🗹 Gain Pattern set to ITU-R S.672-4 (Ln -25) for Beam: TKR on : TURKSAT-42E-B
	TYPICAL 1M2	6M00G7W			⊤ C/I dB	20.16		2 J Boresight set to Lat 3.8, Long 20.0 for Beam: TKR on : TURKSAT-42E-B
	TYP-KU-1M2	9M00G7W 27M0G7W			Threshold dB	20		Interference Cases
	TO/DECAL AMO				Margin dB	0.16		Interfering Cases
	TYPICAL-1M2							a manufacture of the second seco
Selected Freq	TYPICAL-1M2 MOBILE-1M2 TYPICAL-KI I-1M2	27M5G7W			тк	150		3 ✓ I Peak Density set to -22.61 dBW for Beam Pair: TKR→KTM and 27/H067W into 26/H0F9W
Asset belongs to: Selected Freq Selected Beam Another Deam	MOBILE-1M2					150 -133.48 10.77		3 ☑ 1 Peak Density set to -22.61 dBW for Beam Pair: TKRKTH and 2714057W into 26400F9W 4 ☑ Polarisation Loss at to 3.00 @W for Beam Pair: TKRKTH and 2714057W into 26400F9W 5 ☑ Aggregation Factor set to 1.00 @W for Beam Pair: TKRKTH and 2714057W into 26400F9W

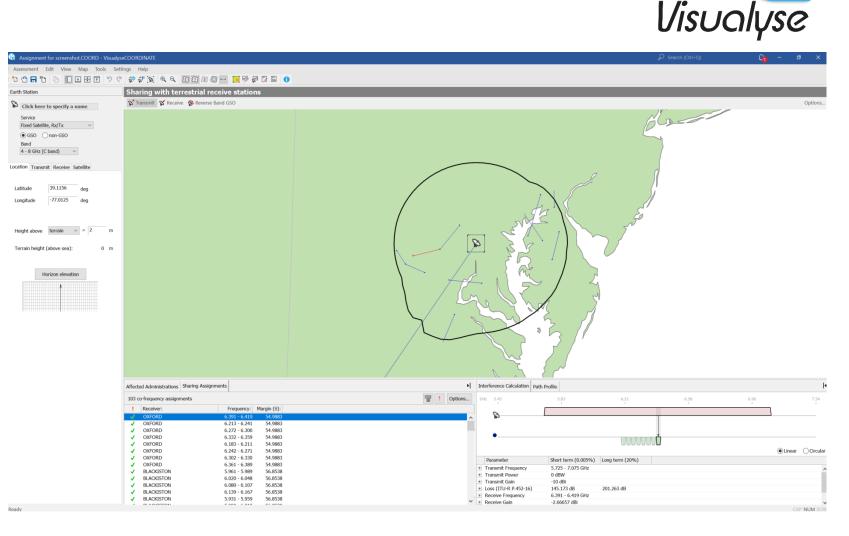
Designed for GSO to GSO satellite coordination Visualyse GSO Detailed Coordination Views:

- Interference cases
- Network editor
- Calculations
- Beam overlaps
- Constraints

Visualyse Coordinate

- Visualyse Coordinate supports the coordination of satellite ES with terrestrial services
 - Both GSO and non-GSO ES
- Implements algorithm in Appendix 7 to generate contours
 - Mode 1 and Mode 2
- Can undertake detailed interference analysis with those assignments inside the contour
- Can interface to databases:
 - Terrain / surface data
 - FS assignments
 - ES assignments
- Site Analysis tool to identify preferred location for new ES or gateway





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Visualyse

Visualyse EPFD

- Visualyse EPFD uses the algorithm in Recommendation ITU-R S.1503-2 to determine if non-GSO FSS networks meet the EPFD thresholds in Article 22 of the Radio Regulations
 - EPFD = Equivalent Power Flux Density
- Visualyse EPFD is a commercialised version of a tool developed for the ITU
- Visualyse EPFD has an interactive user interface that:
 - Shows the runs generated
 - Shows the status of each run
 - Shows the worst case geometry (WCG) calculated
 - Allows different geometries of GSO satellite and Earth Station to be selected
 - Shows the location of each non-GSO satellite and Earth Station
 - Shows the calculation components that make up the aggregate EPFD
 - Includes additional optimisation and performance options
 - Includes ability to undertake Resolution 770 analysis to check Q/V band systems against the 22.5L limits agreed at WRC-19
- Additional tool to support the generation of satellite PFD mask:
 - PFD Mask Generation Tool



Visualyse EPFD Users and Requirements

Different User Communities have different requirements



Non-GSO Operator:

- Need to generate PFD Masks
- Need to ensure system and its filings will meet the EPFD limits
- Need to optimise system design including PFD Masks
- Need to check other geometries

GSO Operator:

- Want to check their geometry will be protected (not just the worst-case geometry)
- Check assumptions behind non-GSO filing
- Check sensitivity to non-GSO system parameters

Regulators:

- Might want to do their own checks on individual systems
- Might want to check aggregate EPFD limits against Resolution 76 limits
- Might want to do their own checks on Q/V band systems under Resolution 770



PFD Mask Generation Tool

- Generates the PFD masks required for • EPFD(down) analysis
- Can model systems using: •
 - Steerable spot beams
 - Single fixed pointing beam
- Outputs:
 - PFD(az, el) mask in ITU's XML format
 - Visualisation files of PFD(az, el) by latitude
 - Density and distance fields required for EPFD(up) analysis

Parameter File:

Directory:

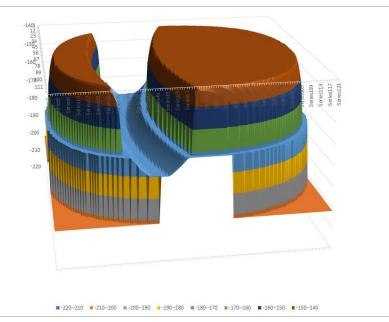
PFD Mask:

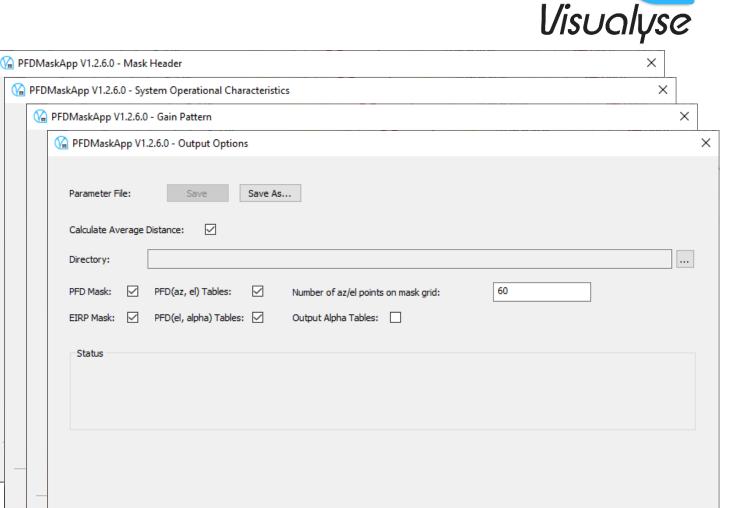
EIRP Mask:

-Status

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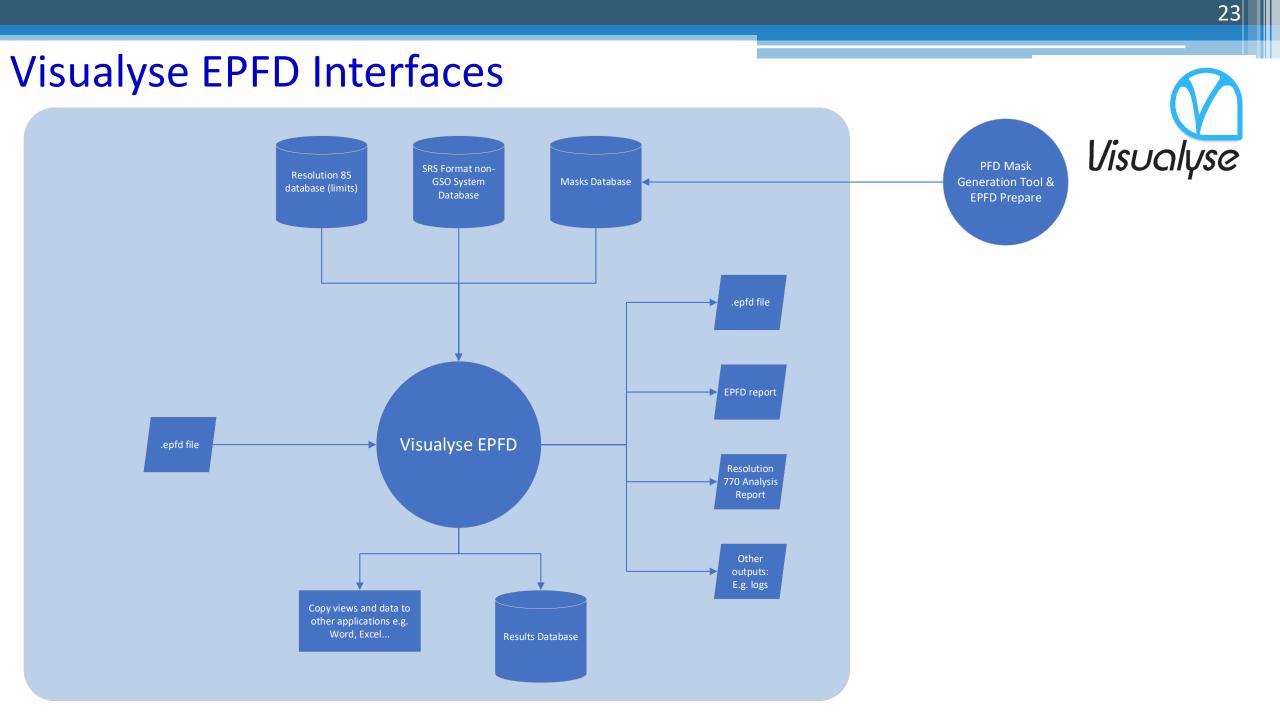
< <u>B</u>ack

Create

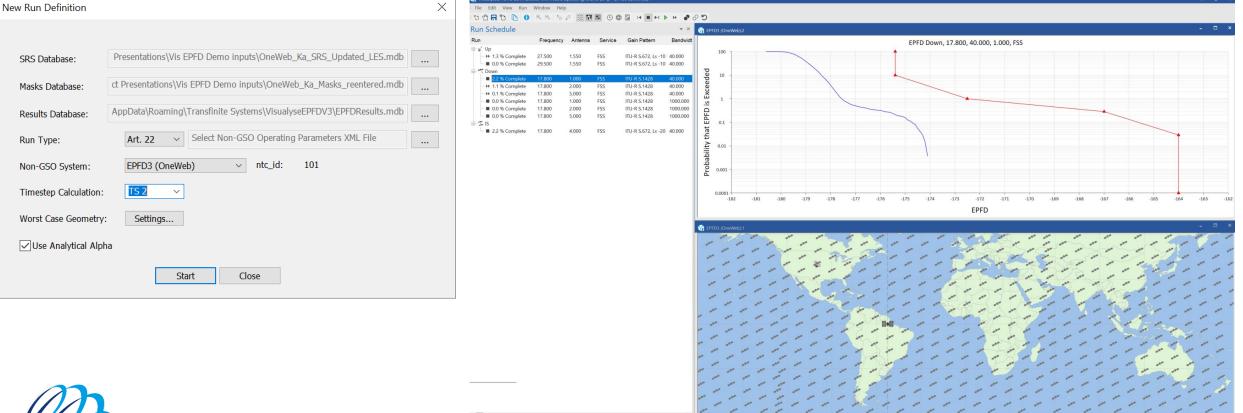
Cancel

Help

22



Visualyse EPFD Analysis

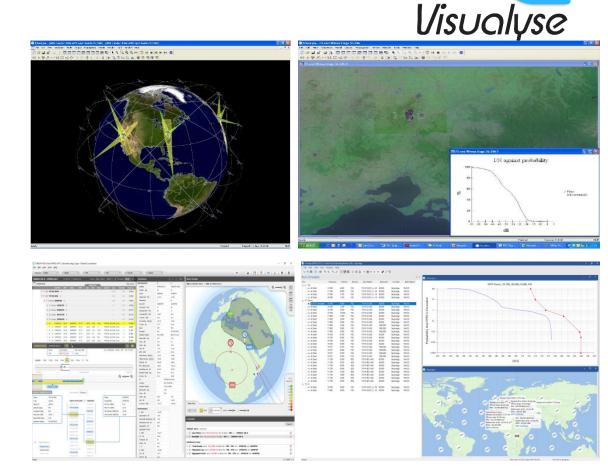




Visualyse

Why Visualyse Products?

- Best in class products
- Trusted world-wide
- Extensively tested
- Fully supported
- Fully featured
- Continually developed





Thank you!

- Demonstration software available from our web site
- Happy to provide slides
- Further information available on request



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