The ESA **SISN@7** Project

Real-Time Access to the EGNOS Services across the Internet



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PRESENTATION OUTLINE



INTRODUCTION (I)

Broadcast of EGNOS messages through GEO is a very efficient strategy for many users. Yet, some users:

- may also wish transmission through other means (or combination with other navigation systems) to avoid potential GEO blocking (e.g (e.g. land mobile user in cities)
- may be interested in EGNOS real-time information for scientific/technical purposes without wishing to invest on a receiver (e.g. IONO map of Europe, EGNOS performance monitoring, etc)





INTRODUCTION (II)

- ESA ARTES-5 (ASTE) program: covers both the combination of EGNOS with other sensors and integration of EGNOS and terrestrial regional networks
- ESA SISNET Project aims at complementing the ASTE initiatives by providing the EGNOS test bed signal available through the Internet in realtime





GPS vs EGNOS at 25 degrees masking





ARCHITECTURE OF SISNET







BASE STATION SOFTWARE

SISNET Base Station Software 1.3 (c) ESA 2001 F. Toran, J. Ventura-Traveset, J.C. de Mateo Options

GPS Week: 78	GPS Time: 1194	106.129		SIS2DS Server	
EGNOS Message Sent				IP address:	12
53103FFC000000000000	000000000000000000000000000000000000000	00888000000003E9AE(CC*38	Listens to port:	88
Connecting to Data Servi Connected to Data Servi Disconnected from Data Connecting to Data Servi Connected to Data Servi	ər rl Server. ər rl			OK.	
1		ACK Described	Fron		





🗙 Cancel





DATA SERVER SOFTWARE

SISNET Data Server Software 1.3 (c) ESA 2001 F. Toran, J. Ventura-Traveset, J.C. de Mateo Signification Significat

ctual EGNOS Message	GPS Week: 78	GPS Time: 119021.129
:6113FF400000000000000000	00000000000000000000000000000000000000	3D5668*38
og Window		
ase Station Connected to th lient connected: 127.0.0.1 o	e Data Server!!! n port 1379	
lient connected: 127.0.0.1 o	n port 1380	
	Connected	users: 2
27.0.0.1 on port 1379 27.0.0.1 on port 1380	Connected	users: 2
27.0.0.1 on port 1379 27.0.0.1 on port 1380	Connected	users: 2
27.0.0.1 on port 1379 27.0.0.1 on port 1380	Connected	users: 2
27.0.0.1 on port 1379 27.0.0.1 on port 1380 Receiving	Connected Sending Answer Storing on D	users: 2

Server IP Address:	131.176.125.16
Listens to port:	7777









ESA USER APPLICATION SOFTWARE (II) GUI

<u>Eler</u> en	minuus	292	US APPLIC	ER		
			SOFT	WARE	SISNET User Appli	cation Settings
EGNOS Message:	GPS Week: 78	GPS Time: 119973.129	Message Type: 2		DS2DC Server	
53080000000003FD	3FB808C000000028000	0000000003BB9497B8FBBB88	BE318*4C		IP address:	131.176.125.1
10/09/01 18:43:2	n				Listens to port:	J7777
Disk Buffering	Auto-Reconne	ct	F			
	st waiting for	data Data Heceived				









CURRENT STATUS OF THE SISNET PROJECT (I)

- A first prototype of the SISNET concept has been successfully set-up by ESA in August 2001
- The system components run on PCs, connected through the ESA internal network.
- First implementations of the ESA User
 Application Software are currently working and continuously evolving.



INTERNAL ONGOING DEVELOPMENTS (I)

- Real-time maps of the ESTB performance
- Real-time monitoring of the ESTB SIS Status through the Internet
- Augmented GPS through Internet
- Real-time analysis of the ESTB messages (ESTB Lab)

1NTERNAL ONGOING DEVELOPMENTS (II) REAL TIME MAPS OF THE ESTB PERFORMANCE

2NTERNAL ONGOING DEVELOPMENTS (VIII) REAL TIME MONITORING OF THE ESTB STATUS

SISNET USER APPLICATION **REAL-TIME SIS STATUS WINDOW** SOFTWARE ESTB SIS Broadcast Status Current ESTB SIS Broadcast Status: UPE work, 20 GPE Time 119873(129 Mer method is SISNETR(a) 200 17 18 12 P Did Latero P Asofe 24 25 26 27 63 Close Descret Comment of the and see From €20 Carlos Carlos Carlos Carlos **REAL-TIME REMOTE WEB ESA ESPADA 4.1 REAL-TIME VPL SIS STATUS** SIMULATION SOFTWARE AVAILABILITY MAPS SERVER (WWW) **SISN@T** esa

3 NTERNAL ONGOING DEVELOPMENTS (III) POSITIONING THROUGH THE INTERNET

4INTERNAL ONGOING DEVELOPMENTS (IV) REAL-TIME ANALYSIS OF THE ESTB MESSAGES

ESTB LAB

4INTERNAL ONGOING DEVELOPMENTS (VI) REAL-TIME ANALYSIS OF THE ESTB MESSAGES

Mussage Types 2 - 5

PRN	PRC (m)	UDRE Variance(m2
1	3.625	1.2992
2	0	Not Monitored
3	0	Not Monitored
4	1.625	0.4678
5	0	Not Monitored
6	0	Not Monitored
7	0	Not Monitored
8	-130.75	2078.695
9	0	Not Monitored
10	0	Not Monitored
11	0	Not Monitored
12		
13	-131.625	0.4678
14	0	Not Monitored
15	0	Not Monitored

INDUSTRIAL DEVELOPMENTS

SISNET prototype is now going to **be complemented through several industrial activities (**currently under discussion). Objectives cover:

- Development of an integrated SISNET receiver (including GPS receiver + GSM/GPRS internet link).
- **Demonstrations**: SISNET receivers embedded into cars.
- □ Professional **ESTB lab** using SISNET.
- SISNET network improvements (security, delays, number of simultaneous users, ...).
- **Development of a GPS mobile phone SISNET powered.**

CONCLUSIONS (I)

- □ SISNET allows the access to the ESTB signal through the internet.
- The first **prototype has been successfully set-up** by ESA in august 2001.
- ESA has developed the first implementation of the **user** application software. A specific SISNET user interface control document (ICD) is already available for any one wishing to develop SISNET-based user applications.
- Next step: complement the prototype with industrial work including integrated SISNET receivers and demos.

CONCLUSIONS (II)

□ The three A's of the ESA user application SISNETbased capabilities:

Augmented GPS positioning through the internet.

- <u>Analysis</u> of the ESTB messages and SIS status in real time.
- Availability maps of ESTB performances in real time.
- **ESA intends to make SISNET available externally before the end of 2001.**
- The combination of EGNOS and the internet may open a large amount of applications for satellite navigation.

