



Presented at the FIG Working Week 2017,  
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# Trusted Data Communication and Security Issues in RTK GNSS Network

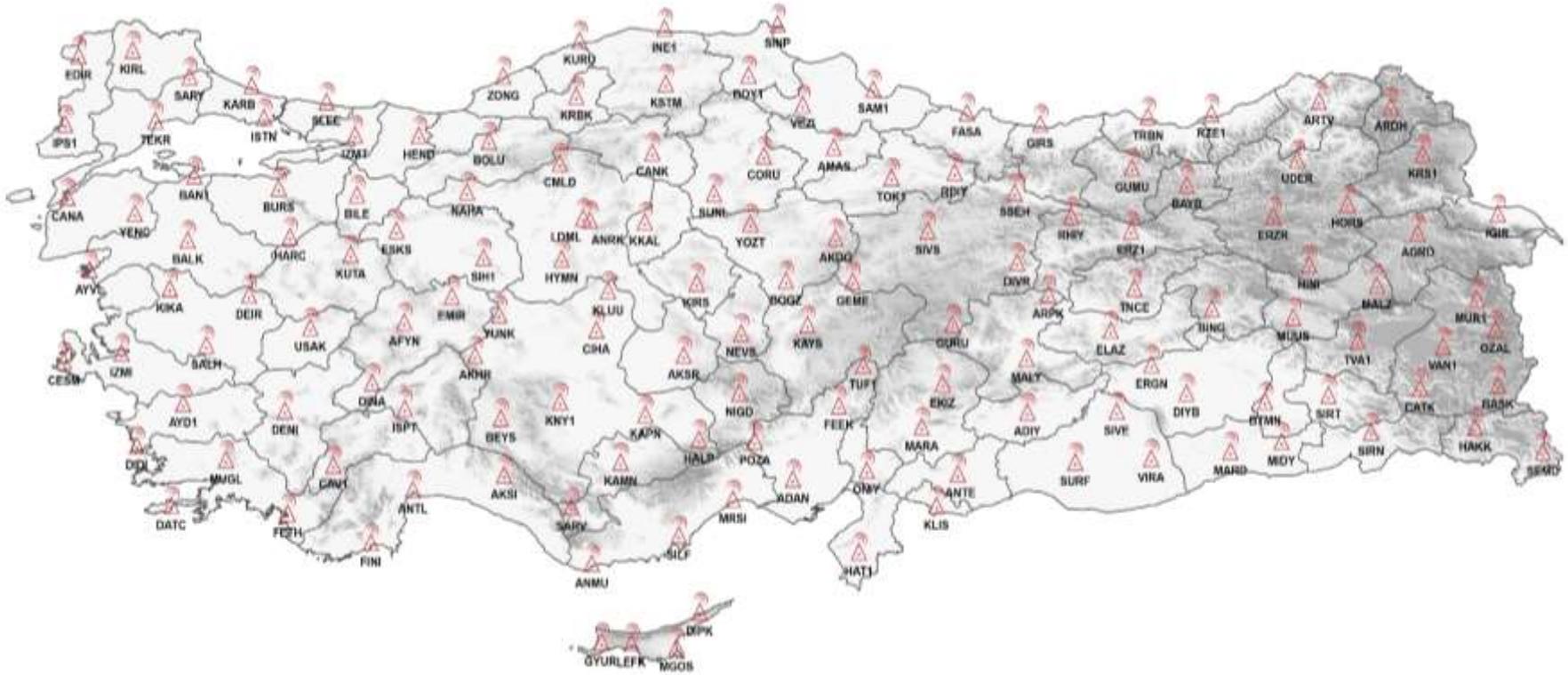




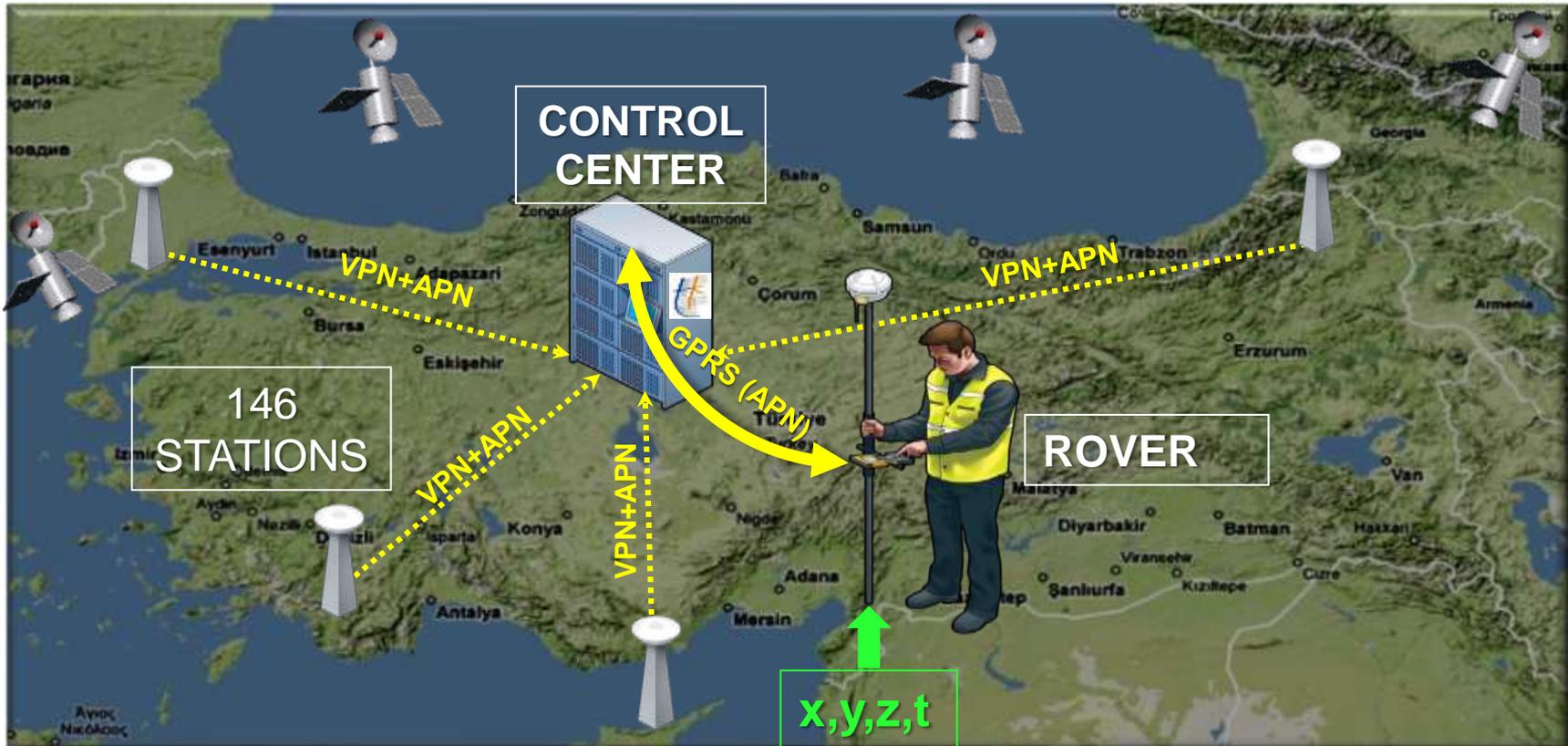
# CORS-Tr



# CORS-Tr Stations-146



# Network RTK Communications



# IT Infrastructure and Cyber Security



## CORS-Tr Previous Operational Problems

**Lack of IT Personnel:** Department had only Surveying Engineers to operate CORS-Tr system, user membership and payment issues and to supporting users. Department hadn't any IT persons to control system in case of technical problems appeared.

**DDOS Attacks:** In year 2013 summer season which always are done very dense mapping application on th field by using CORS-Tr, we had very hard DDOS attack by unknown source. DDOS attacks was continued appraximity 3 moths and everyday.



# CORS-Tr Operational Problems

**CORS-Tr Users:** Some external user has managed their GNSS instrument settings to send more than five request in a second to connect CORS-Tr system. These request was interrupted other user connections and oversized data communication bandwidth.



**CORS-Tr Comminicaions:** GNSS Station to Control Center(CC) connections was ADSL and rover user to CC connection was GPRS.

## Cyber Security

Cybersecurity is the body of technologies, processes and practices designed to **protect networks, computers, softwares and data** from attack, damage or unauthorized access.

**Ensuring cybersecurity** requires coordinated efforts throughout an information system. **Elements** of cybersecurity :

- Network security
- Application security
- Information security
- Disaster recovery / business continuity planning
- End-user education

## Improvements-Trusted CORS-Tr services

1- Two Computer Engineer and an Electrical and Electronical Engineer employed to operate COSR-Tr IT works.

2- to prevent DDOS attacks, ARBOR UTM security device provided.

### Arbor Networks' Product Portfolio



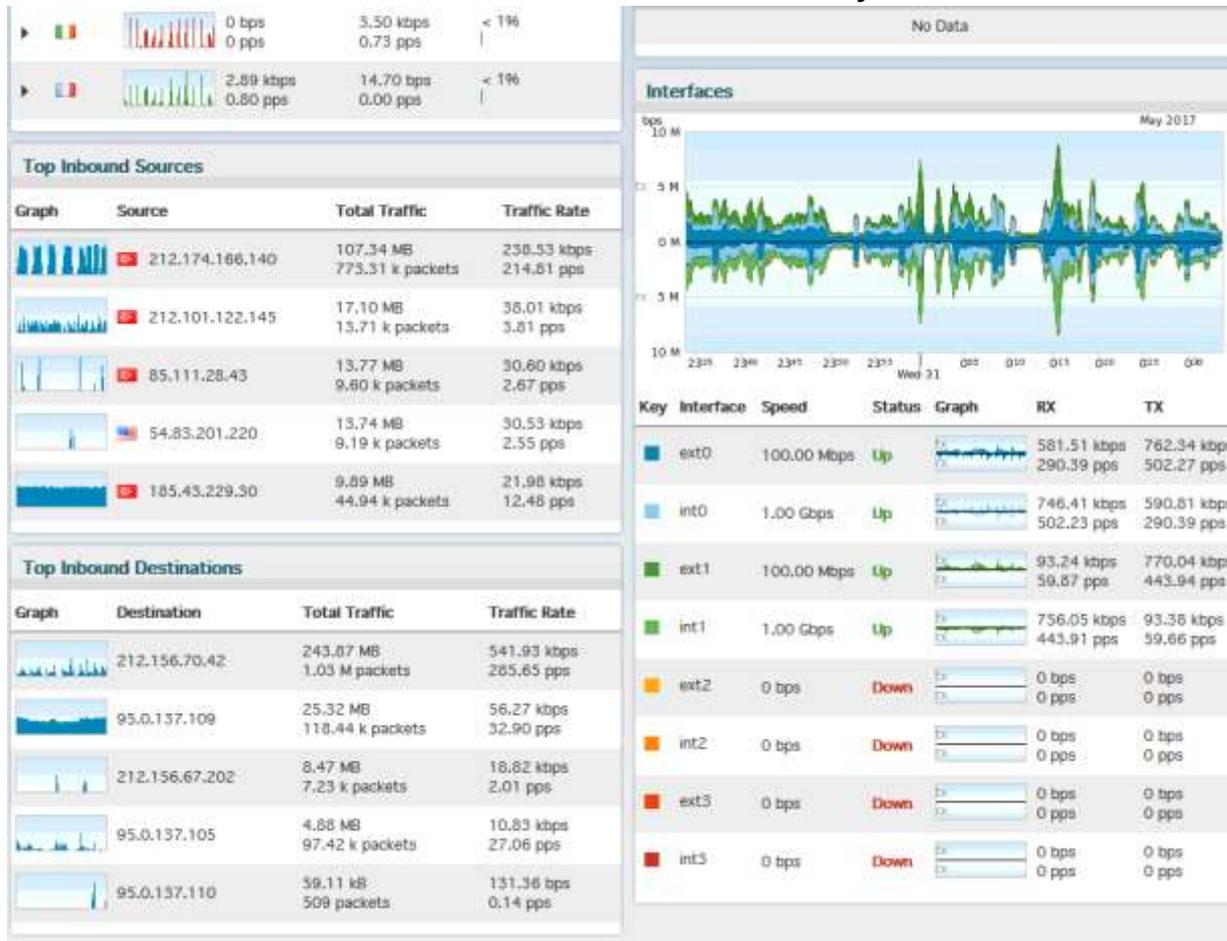
## Improvements-Trusted CORS-Tr services

3- “Data Backup and Archiving Directive” according to the ISO 9001 Standarts has been prepared.

DATA TYPE	BACKUP PERIOD	LOCATION	DURATION	TIME DELIVER TO ARCHIEVE
RINEX 1 Sec.	Weekly	Server	3 Month	-----
RINEX 30 Sec.	Monthly	Server	1 Year	End of the Year
Database Logs	Monthly	Server	Endless	End of the Year
Control Center Sec. Camera Records	Monthly	Server	6 Month	-----
Callcenter Voice Records	Monthly	Server	1 Year	-----
DATA TYPE	ACHIEVING PERIOD	WHERE	DURATION	
RINEX 30 Sec.	Yearly	D. Archive	20 Years	
Database Logs	Yearly	D. Archive	Endless	

## Improvements-Trusted CORS-Tr services

4-Data communication band with increased from 20 GB to 50 GB when unexpected external user dense connection activity realized.



## Improvements-Trusted CORS-Tr services

5- APN Tunnel has been established for rover GNSS receiver commincations

Erişim noktası düzenle ivivis proxy Ayarlı değil	Erişim noktası düzenle
MMS portu Ayarlı değil	İsim TURKCELL İNTERNET
MCC 286	APN
MNC 01	Proxy Ayarlı değil
Onaylama türü PAP	Bağlantı noktası Ayarlı değil
APN türü default,supl	Kullanıcı adı
APN protokolü IPv4	Şifre
APN'yi etkinleştir/devre dışı t. <input checked="" type="checkbox"/> APN Etkin	Sunucu Ayarlı değil
Taşıyıcı Belirsiz	MMSC Ayarlı değil
	MMS proxy

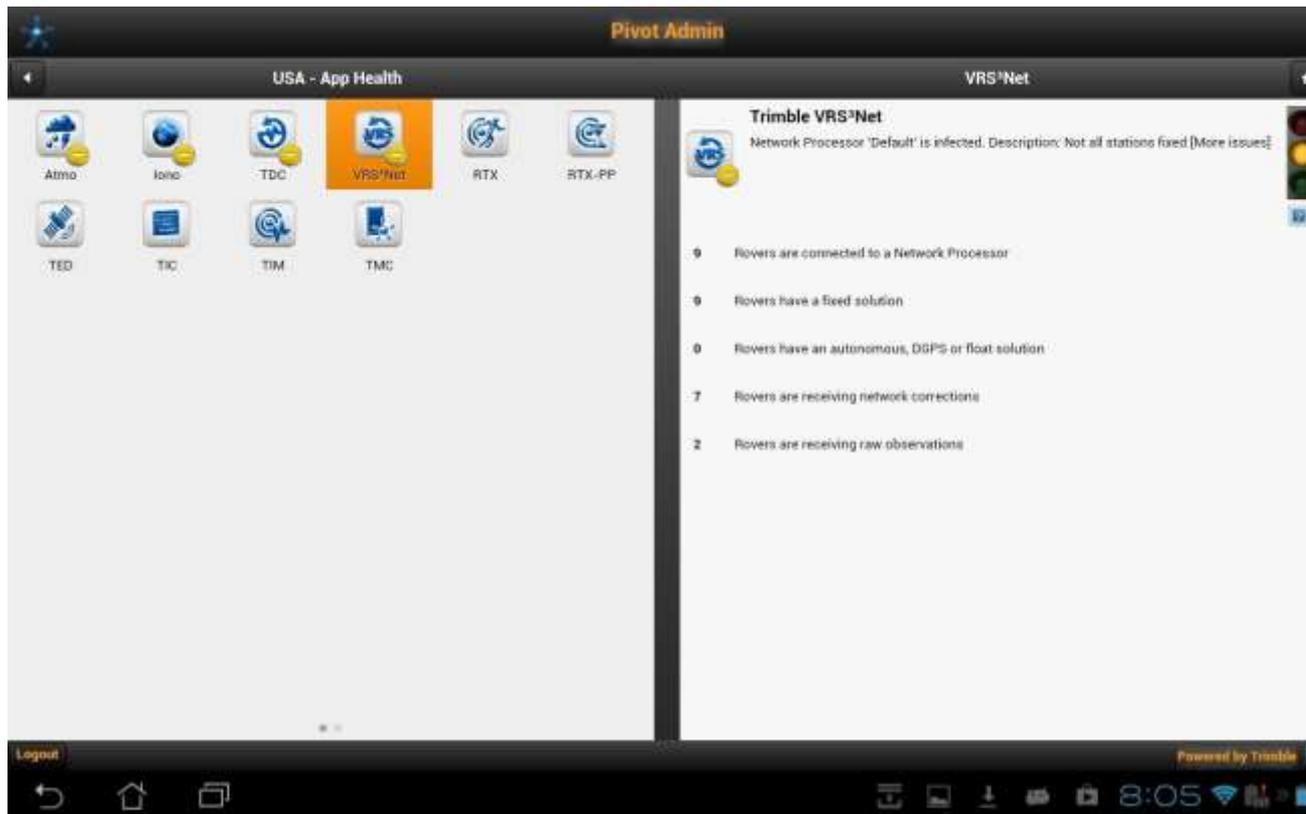
## Improvements-Trusted CORS-Tr services

6- VPN tunnel between GNSS stations and Control Center as primary data communication and 3G VPN tunnel as backup established.



## Improvements-Trusted CORS-Tr services

7- CORS-Tr software upgraded to latest version (PIVOT)



## Improvements-Trusted CORS-Tr services

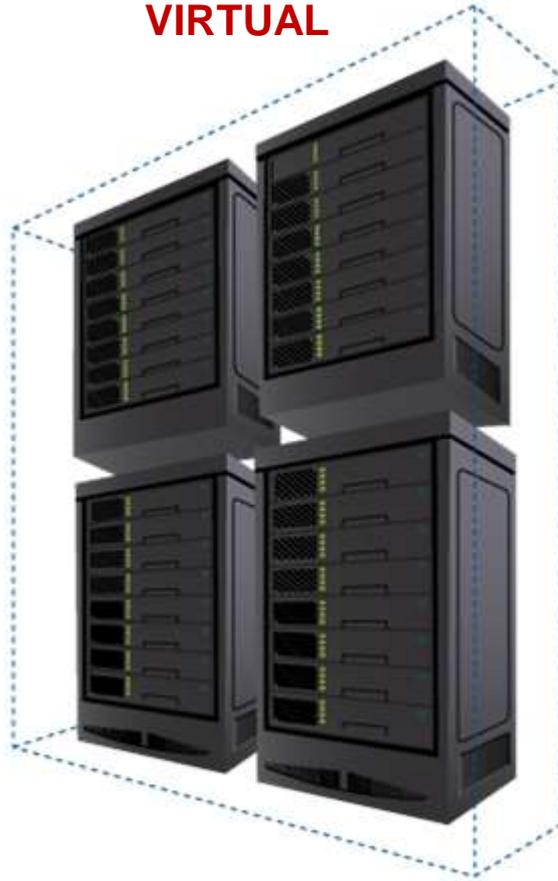
8- New 64 bit hardware provided

**PHYSICAL**



21 Server

**VIRTUAL**



5 Server

**STORAGE**

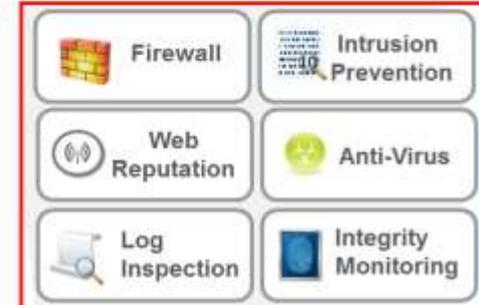
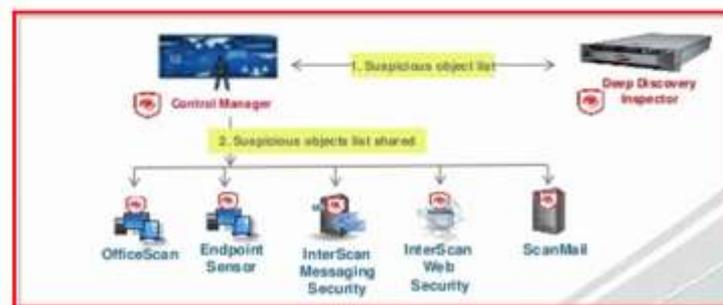
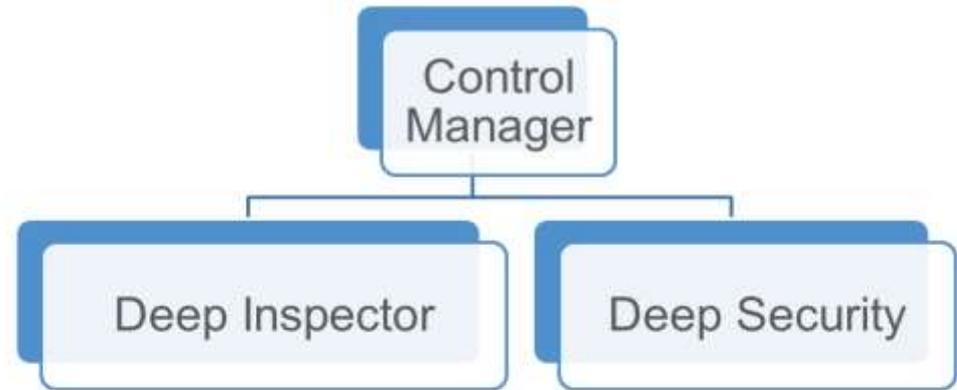


300 TB  
Extendable  
2 PB

## Improvements-Trusted CORS-Tr services

9- Our main application is Network RTK Services and providing RINEX data to users. SQL databases are protected with security software for cyber attacks.

10- CORS-Tr network, server and end points are protected by a software from inside and outside cyber attacks.



## Improvements-Trusted CORS-Tr services

11- We are also testing with an appliance to match IMEI address of GNSS receiver and mobile number.

12- CORS-Tr users are informed by 444 GNSS hotline, SMS messages, Social Media and local trainings.



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**THANK YOU ...**