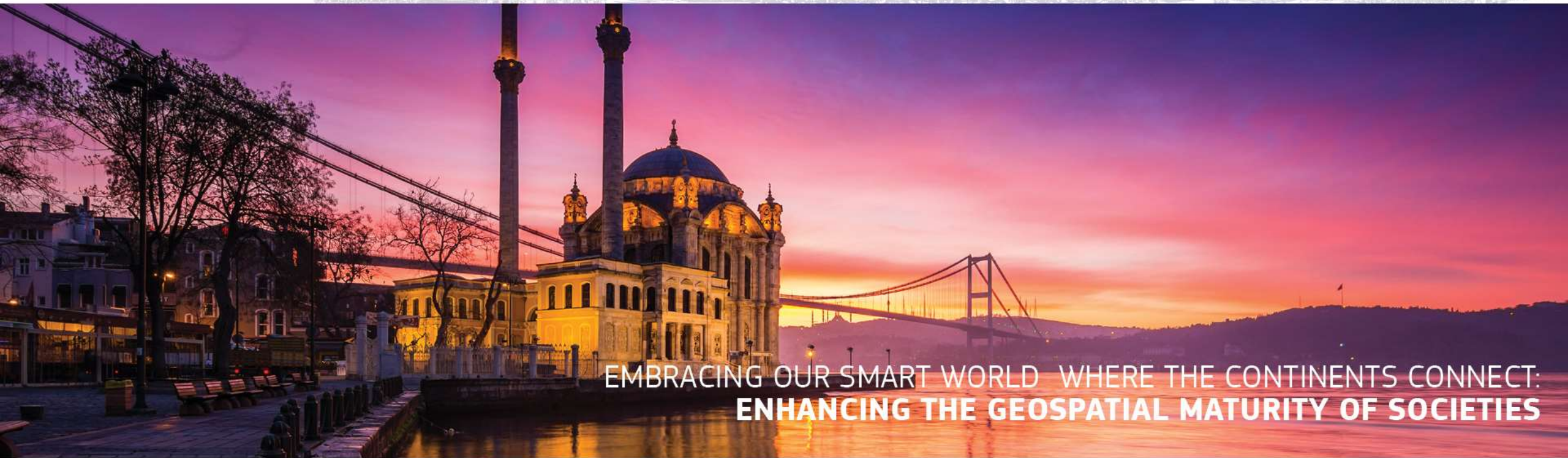




# XXVI FIG CONGRESS

8-11 May 2018, İstanbul

## CHALLENGES IN DATA COMMUNICATION AND CYBER SECURITY OF TUSAGA-Aktif (CORS-Tr)



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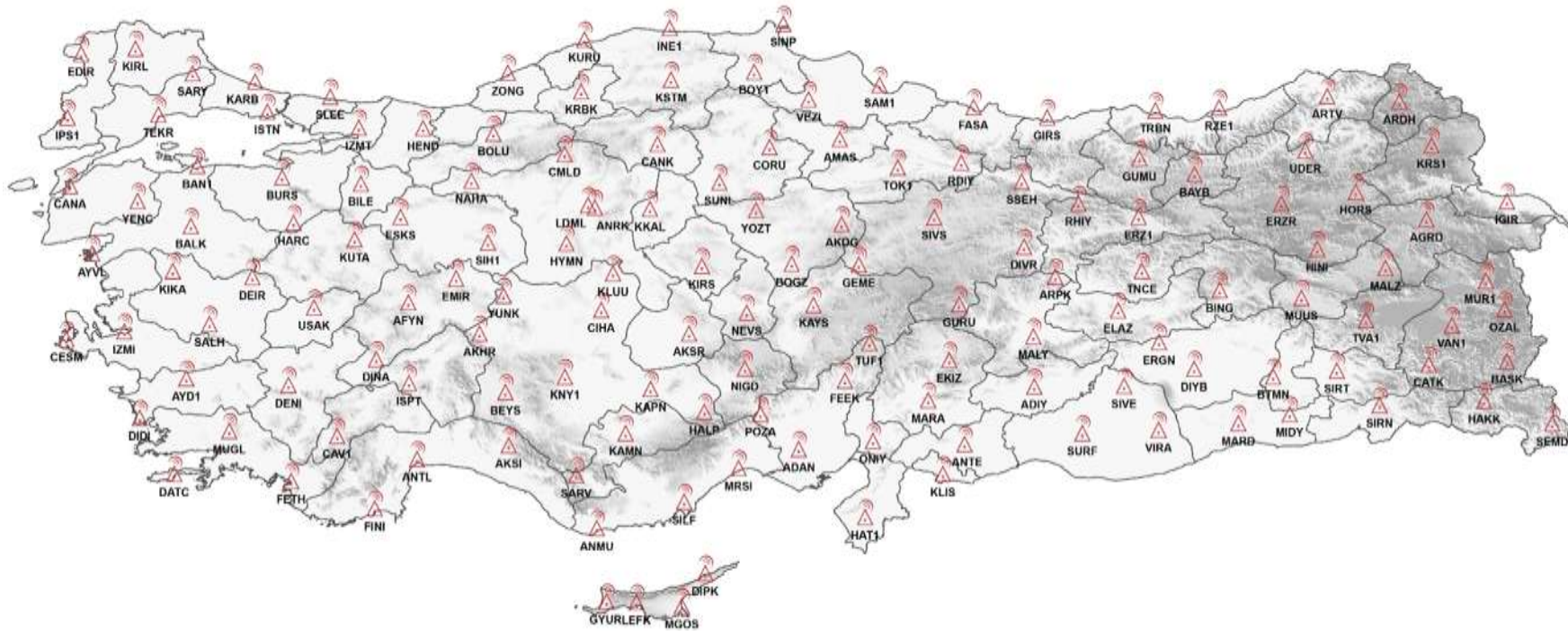
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6-11 May 2018, İstanbul

## CORS-Tr Stations-146



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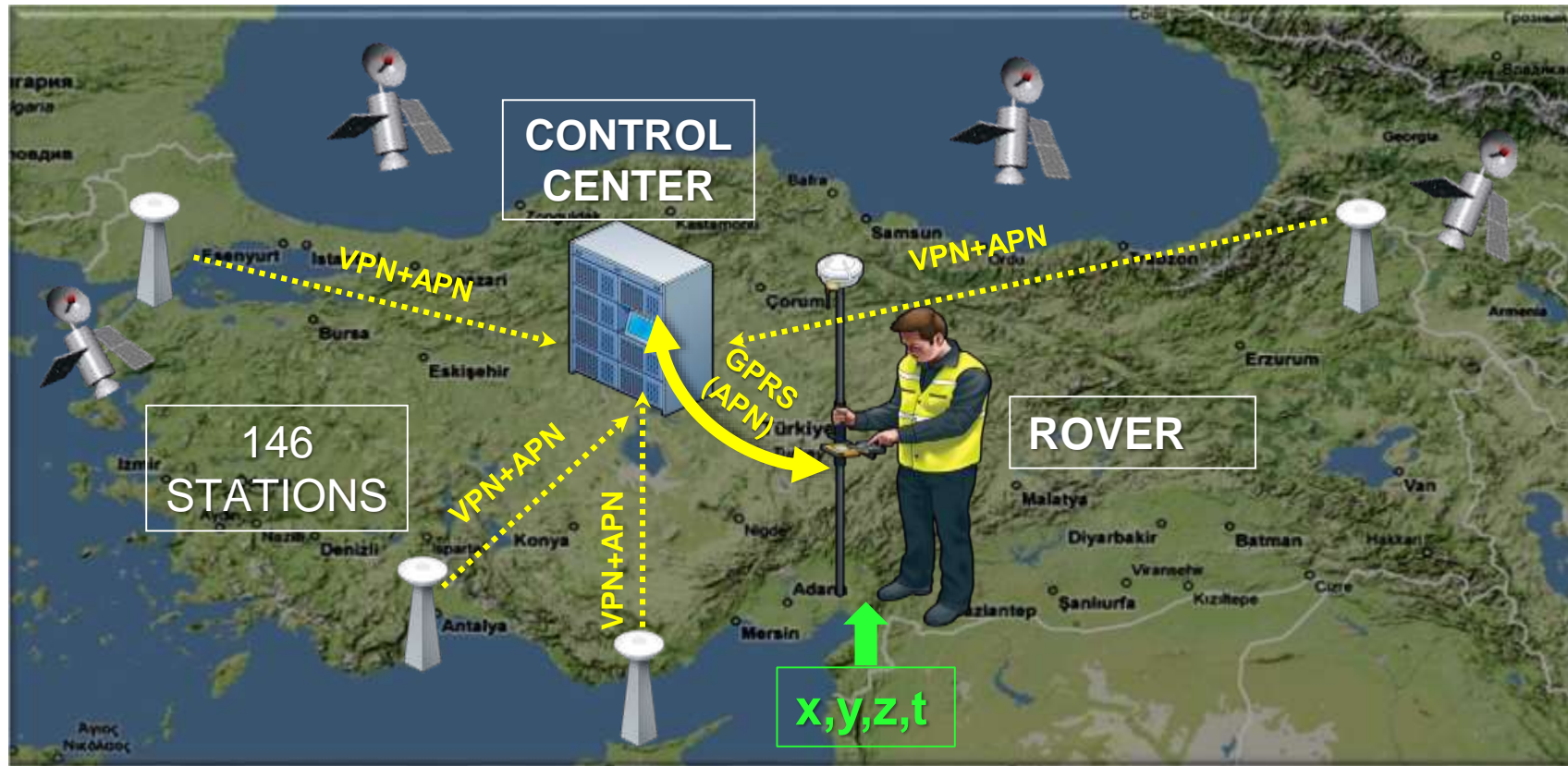


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# Network RTK Communications



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## IT Infrastructure and Cyber Security



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## 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 support users. Department hadn't any IT staff to control system in case of technical problems appeared.

**DDOS Attacks:** In summer season of 2013 which mapping applications on the field by using CORS-Tr is very dense, our system had a very big DDOS attack by an unknown source. This DDOS attack was continued for approximately 3 months on everyday basis.

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## CORS-Tr Previous Operational Problems

**External Users of CORS-Tr :** Some external users managed their GNSS instrument settings to send more than five requests in a second to connect CORS-Tr system. These requests interrupted other user connections and saturated data communication bandwidth.

**Internal Users of CORS-Tr :** Internal system users who use computers that has virus, malware, trojan.etc. Internal users who used virus contaminated USB to connect system servers or unsafe remote desktop connection caused danger for the system. Unfortunately Institutional anti-virus system was unable to protect CORS-Tr system. Internal user's awareness on security issues should be increased.



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

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## Cyber Security

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

**Ensuring cyber security** requires coordinated efforts throughout an information system.

**Elements** of cybersecurity :

- Network Security
- Application Security
- Information Security
- Disaster Recovery / Business Continuity Planning
- End-User Awareness and Education

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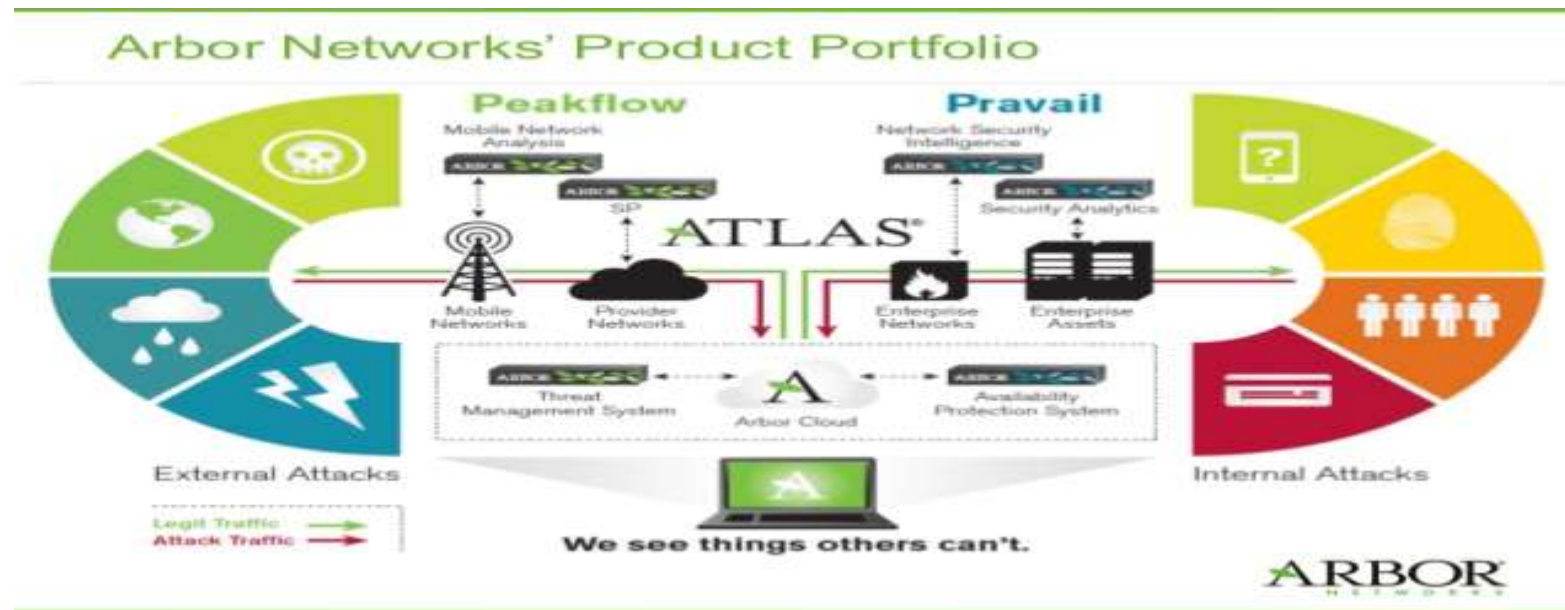
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## Improvements on CORS-Tr Services

- 1- A Computer Engineer and an Electrical and Electronics Engineer are employed to operate CORS-Tr IT works.
- 2- To prevent DDOS attacks, ARBOR UTM security device provided.



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## Improvements on CORS-Tr Services

- 3- Directive about personal computer maintenance including software related security risks issued.
- 4- Data back-up and archiving directive for our employees in Geomatic Department issued.

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	ARCHIVING PERIOD	WHERE	DURATION	
RINEX 30 Sec.	Yearly	D. Archive	20 Years	
Database Logs	Yearly	D. Archive	Endless	

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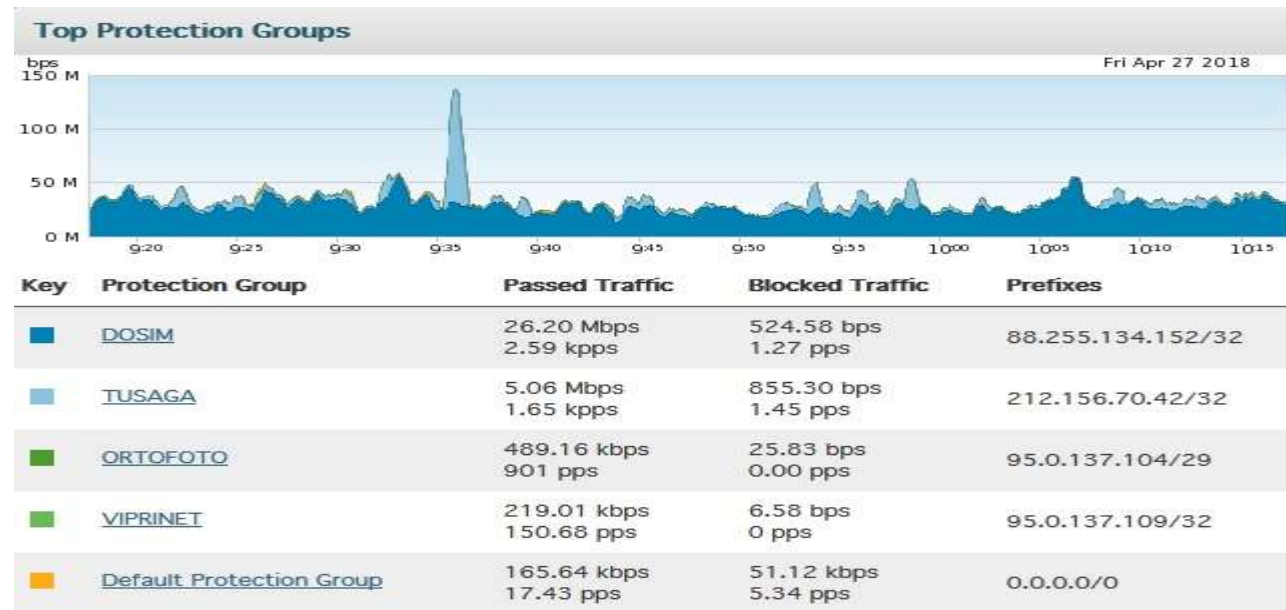




## Improvements on CORS-Tr Services

5- GNSS Station Data and User Info and Activity Logs are started to be backed up by everyday in two different databases.

6- Data communication bandwidth enlarged to 150mbps for giving good service to everyday increasing user count ( 10000+ Users ).



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## Improvements on CORS-Tr Services

- 7- VPN tunnel established between reference station and control center as primary data communication and a 3G APN tunnel as secondary.
- 8- Reference stations' data storage capacity increased.



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## Improvements on CORS-Tr Services

9- APN Tunnel has been established for rover GNSS receiver communications.

Erişim noktası düzenle	Erişim noktası düzenle
İnternet proxy Ayarlı değil	İsim TURKCELL İNTERNET
MMS portu Ayarlı değil	APN
MCC 286	Proxy Ayarlı değil
MNC 01	Bağlantı noktası Ayarlı değil
Onaylama türü PAP	Kullanıcı adı
APN türü default,supl	Şifre
APN protokolü IPv4	Sunucu Ayarlı değil
APN'yi etkinleştir/devre dışı bırak <input checked="" type="checkbox"/>	MMSC Ayarlı değil
Taşıyıcı Belirsiz	MMS proxy

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## Improvements on CORS-Tr Services

10- Current software updated to latest version including required moduls such as

- Realtime Visualization
- Atmosphere
- Transformation Generator
- Online Web Processing.

11- New hardware provided according to updated software requirements.

- 25 Physical Servers
- 10 Virtual Servers
- 300 TB Storage



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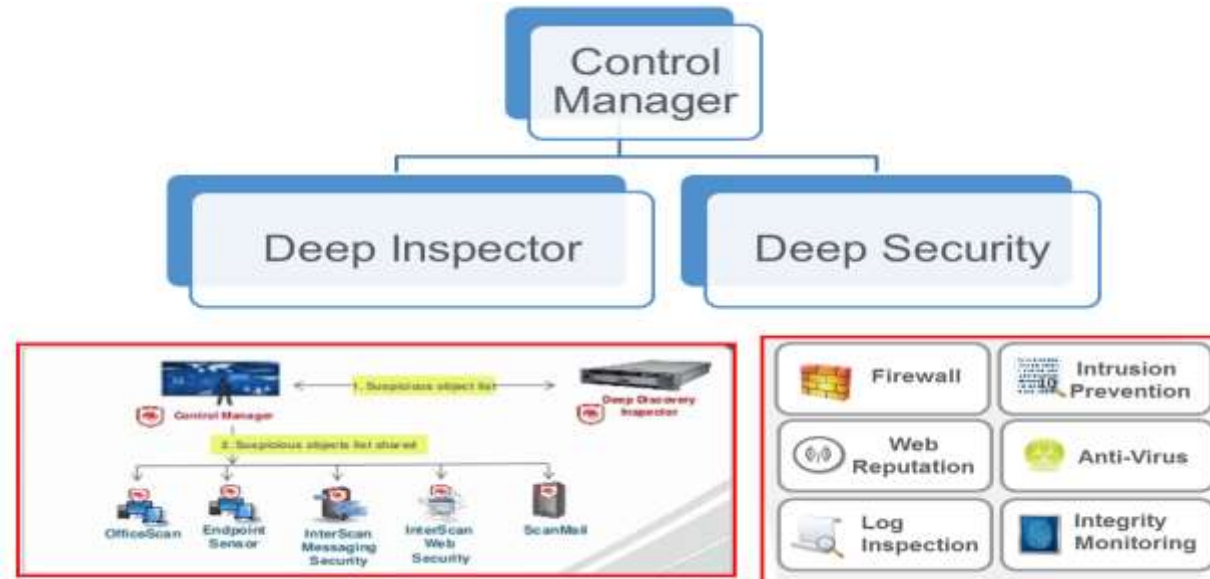
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## Improvements on CORS-Tr Services

12- Our main application is Network RTK Services and providing RINEX data to users. SQL databases are protected by security software against cyber attacks.

13- Main applications like Network RTK correction, networks DGPS correction and provision of RINEX data to our users and SQL databases are protected by extra security software for cyber attacks.



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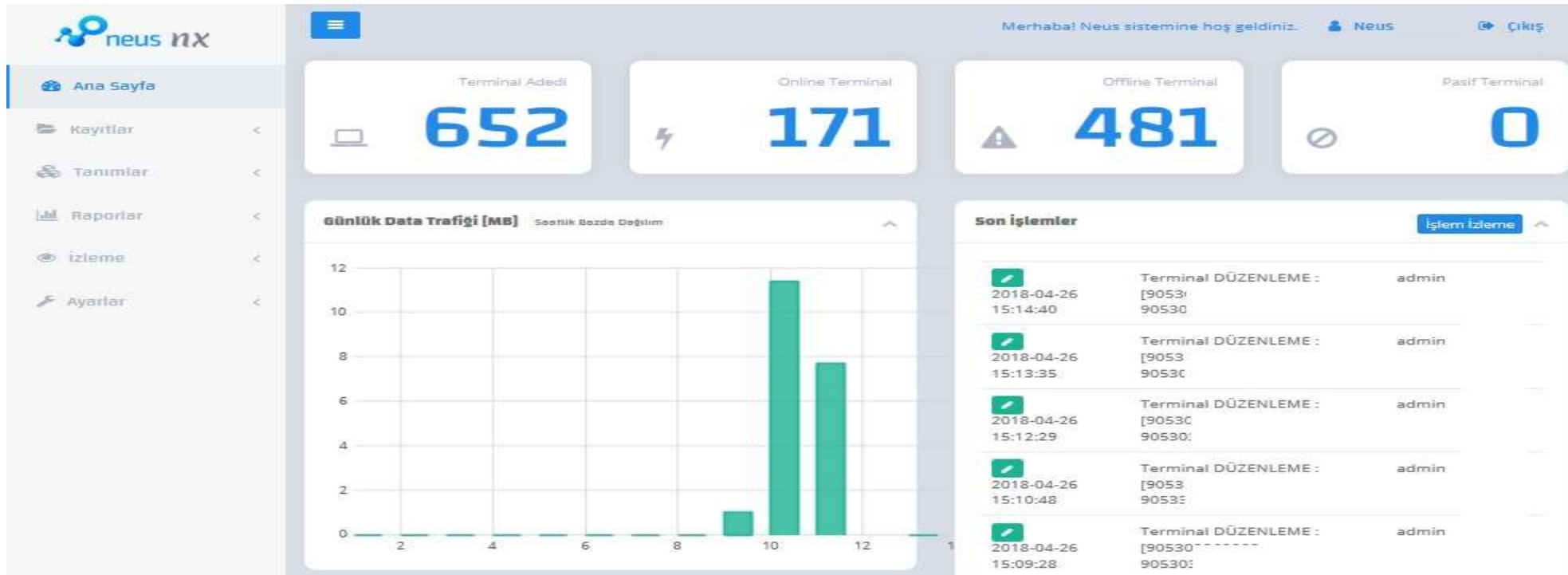


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## Improvements on CORS-Tr Services

14- City border based limitation on TUSAGA-Aktif activated and a new software provided using 3-factor authentication for connecting the system in order to avoid illegal usage of GNSS devices by the employees of regional cadastre offices .



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## Improvements on CORS-Tr Services

15- User awareness of CORS-Tr usage was increased by

- 444 Call Center
- SMS
- Social Media
- Local Training



@haritadaresi



Mahmut Esat (Harita Dairesi)



TKGM Harita Dairesi

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