



Co-funded by
the European Union



Bulgarian National QCI Plan

Granting authority: European Commission-EU

Project Number: 01091399

Progress and intermediate achievements



www.euroqci.bg

*Project 101091399 "National QCI Plan for Bulgaria" is co-funded by the European Union.
The positions expressed are those of the author(s) and do not necessarily reflect the views of the European Union and the European Commission. Neither the European Union nor the co-financing body is responsible for them.*



Co-funded by
the European Union



Partners in the Bulgarian QCI consortium



**Institute of Robotics with BAS:
lead partner of the Bulgarian
EuroQCI consortium**

Associated partners:



Enterprise Communication Group –
a leading system integrator in
Bulgaria and operator of 112 system

- Ministry of Internal Affairs
- Ministry of Transport
- Ministry of Defence
- DSK Bank



Electron Progress – a leading
telecommunications integrator



Correct Consulting Group – a
leading consulting company

www.euroqci.bg

Project 101091399 "National QCI Plan for Bulgaria" is co-funded by the European Union.

The positions expressed are those of the author(s) and do not necessarily reflect the views of the European Union and the European Commission. Neither the European Union nor the co-financing body is responsible for them.



Co-funded by
the European Union



BG NatQCI Plan | Objectives

- Deployment of advanced quantum system for testing quantum communication technologies and particularly QKD in urban environment
- Testing of use cases in support of the national QCI initiatives in the context of EuroQCI
- Deployment and test of pilot long-distance QKD network compatible with the EuroQCI system architecture as a ground for future trans-border interconnection
- Training, demonstration and experience dissemination for large number of potential engineering and managerial users able to understand and operate the new QKD technology within public authorities and industry organizations
- Cooperation with other member states in the deployment plan and the strategic efforts towards designing and building an overall EuroQCI system architecture
- Creating National QCI Roadmap 2024-2027

www.euroqci.bg

Project 101091399 "National QCI Plan for Bulgaria" is co-funded by the European Union.

The positions expressed are those of the author(s) and do not necessarily reflect the views of the European Union and the European Commission. Neither the European Union nor the co-financing body is responsible for them.



Co-funded by
the European Union



EuroQCI



Network topology



Sofia

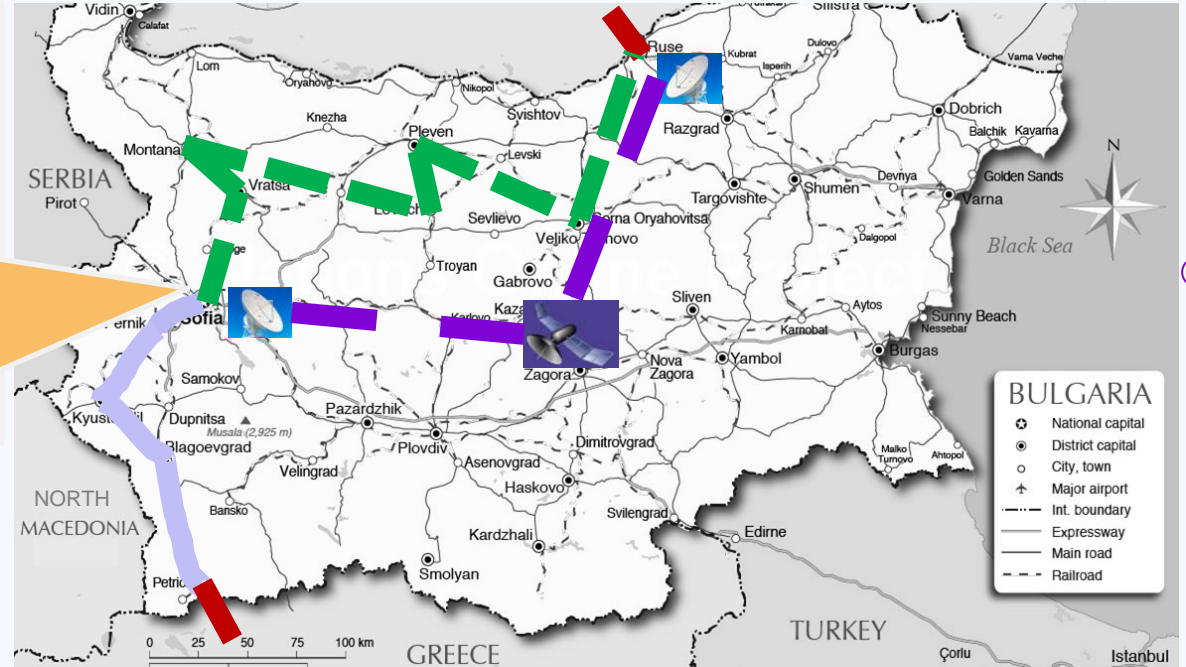
Star

Point-to-Point

Sofia – BG/GR

Four sections

Three TN



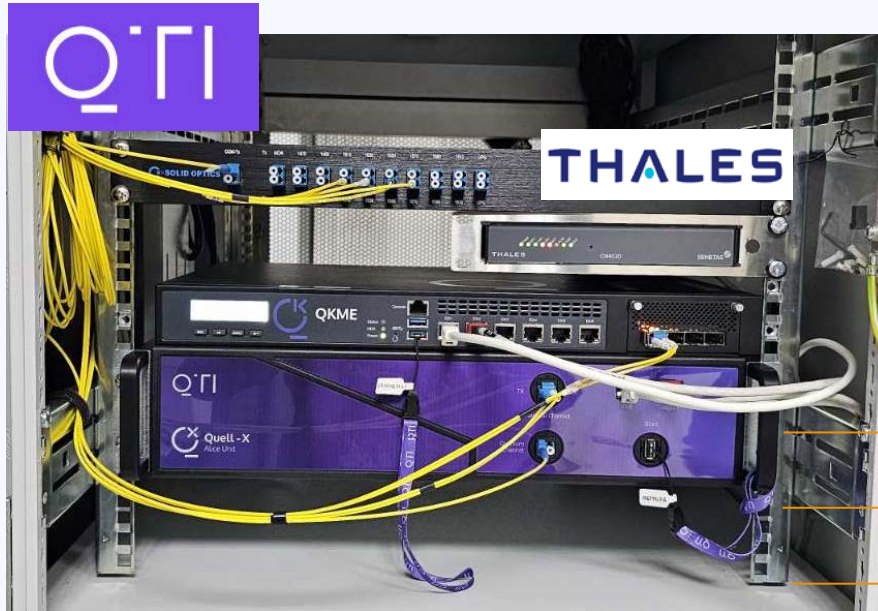
www.euroqci.bg

Project 101091399 "National QCI Plan for Bulgaria" is co-funded by the European Union.

The positions expressed are those of the author(s) and do not necessarily reflect the views of the European Union and the European Commission. Neither the European Union nor the co-financing body is responsible for them.



Equipment view and parameters



Telsy/QTI Quell-X QKD

- BB84 with time bin encoding and decoy states
- Link budget up to 24dB
- Key management protocol ETSI GS QKD 014
- Key generated type AES-256
- Separate QKME unit

Thales CN4020 Network Encryptor

- Maximum speed 1Gb/s
- Encryption AES-256
- Support third party QKD

Terminal node configuration with SAE

www.euroqci.bg

Project 101091399 "National QCI Plan for Bulgaria" is co-funded by the European Union.

The positions expressed are those of the author(s) and do not necessarily reflect the views of the European Union and the European Commission. Neither the European Union nor the co-financing body is responsible for them.



Co-funded by
the European Union



Equipment view and parameters



Trusted node
configuration



www.euroqci.bg

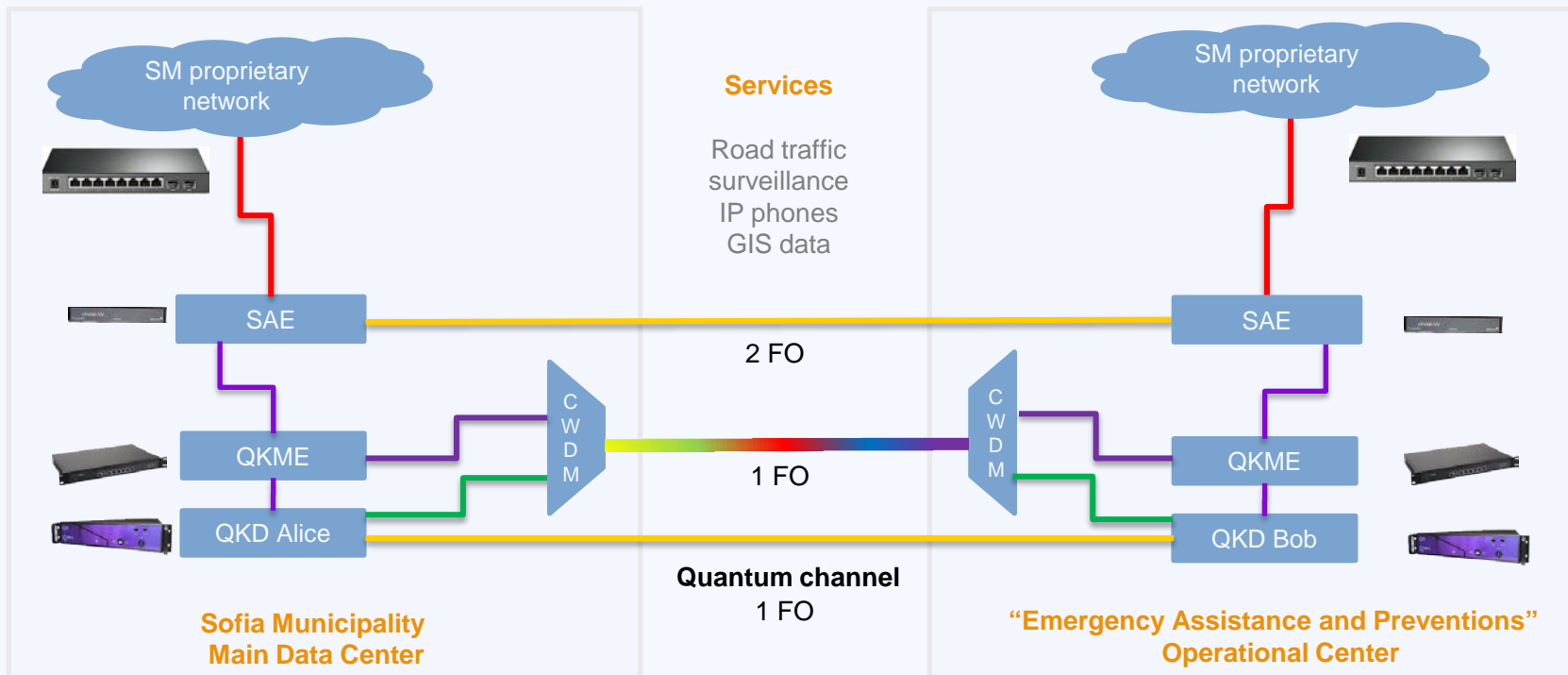
*Project 101091399 "National QCI Plan for Bulgaria" is co-funded by the European Union.
The positions expressed are those of the author(s) and do not necessarily reflect the views of the European Union and
the European Commission. Neither the European Union nor the co-financing body is responsible for them.*



Co-funded by
the European Union



Sofia Municipality secure connection



www.euroqci.bg

Project 101091399 "National QCI Plan for Bulgaria" is co-funded by the European Union.

The positions expressed are those of the author(s) and do not necessarily reflect the views of the European Union and the European Commission. Neither the European Union nor the co-financing body is responsible for them.

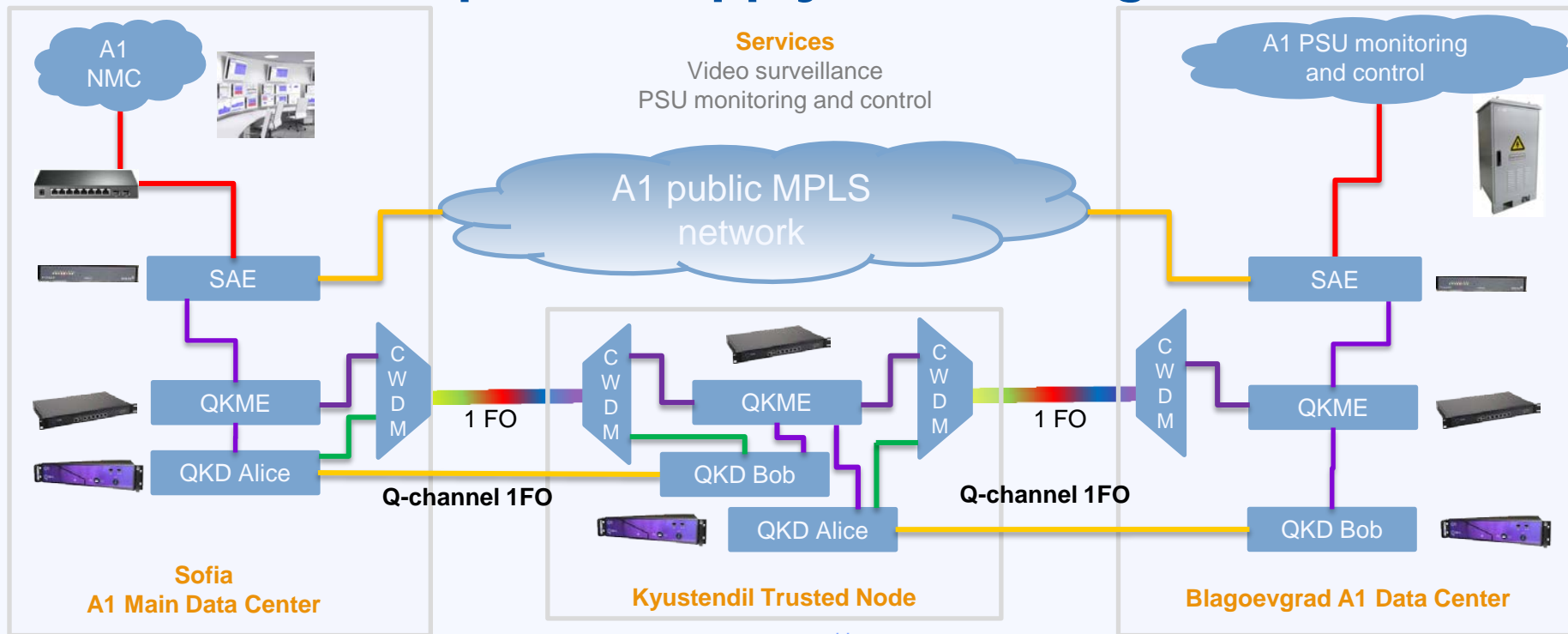


Co-funded by
the European Union

 EuroQCI



A1 power supply monitoring



www.euroqci.bg

Project 101091399 "National QCI Plan for Bulgaria" is co-funded by the European Union.

The positions expressed are those of the author(s) and do not necessarily reflect the views of the European Union and the European Commission. Neither the European Union nor the co-financing body is responsible for them.



Co-funded by
the European Union



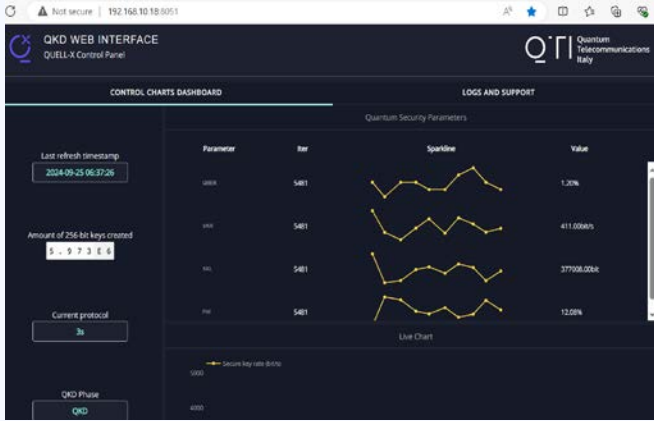
EuroQCI



Equipment performance

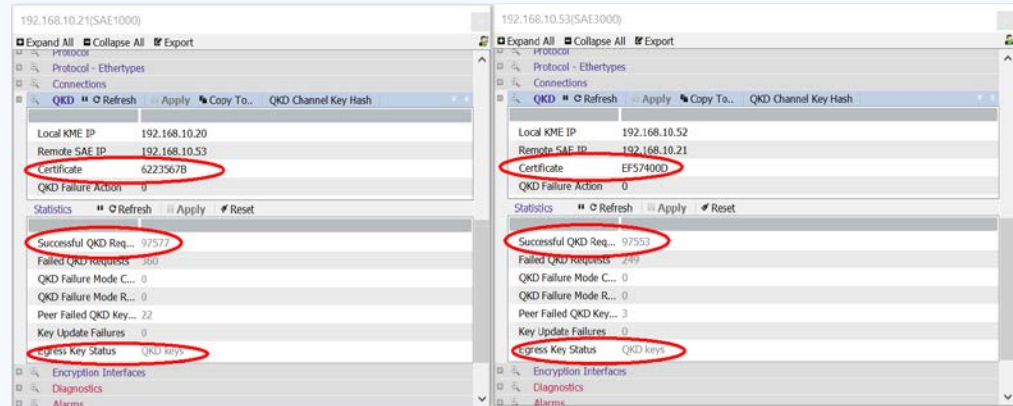
QKD

- Worst average SKR 500 b/s @ 112km section (24dB)
- Best average SKR 3500 b/s @ 2km section (3dB)
- Faultless functioning for 7 months



Encrypted link

- Tested up to 100 Mb/s L2
- Connected to the QKME via ETSI 014 standard interface and https:
- Key refresh time 1 minute
- Faultless functioning 3 months



www.euroqci.bg

Project 101091399 "National QCI Plan for Bulgaria" is co-funded by the European Union.

The positions expressed are those of the author(s) and do not necessarily reflect the views of the European Union and the European Commission. Neither the European Union nor the co-financing body is responsible for them.



Interoperability and standardization

Interoperability Quell-X with CN4020

- First interconnection of those systems
- Unknown before certification procedure
- Grey zone of the standards (SAE ID)
- Mismatch of protocol versions (TLS 1.2 1.3)
- Development of more comprehensive documentation



No.	Method name	URL	Access Method
1	Get status	https://{KME_hostname}/api/v1/keys/{slave_SAE_ID}/status	GET
2	Get key	https://{KME_hostname}/api/v1/keys/{slave_SAE_ID}/enc_keys	POST (or GET)
3	Get key with key IDs	https://{KME_hostname}/api/v1/keys/{master_SAE_ID}/dec_keys	POST (or GET)



Co-funded by
the European Union



Summarization

Negatives

- Lack of understanding regarding the necessity of QKD implementation
- Not market prices of the equipment
- Difficult interactions with public authorities
- Lack of standards
- Potential for developing more comprehensive manuals and documentation about QKD
- Monitoring and management systems at very early stage
- Fans, PSUs, air-filters must be made field replaceable and outside of tamper security

www.euroqci.bg

Project 101091399 "National QCI Plan for Bulgaria" is co-funded by the European Union.

The positions expressed are those of the author(s) and do not necessarily reflect the views of the European Union and the European Commission. Neither the European Union nor the co-financing body is responsible for them.



Co-funded by
the European Union



Summarization

Positives

- Smooth and fast procurement process for both the infrastructure and equipment
- Very good cooperation and interaction with QKD equipment provider Telsy/QTI in all stages of network deployment and operation
- Full support for any issues even with third party equipment and going beyond the contract provisions
- QKD equipment works stable and reliable so far
- Trainings and experience dissemination achieve very good results
- First use cases already completed successfully

www.euroqci.bg

Project 101091399 "National QCI Plan for Bulgaria" is co-funded by the European Union.

The positions expressed are those of the author(s) and do not necessarily reflect the views of the European Union and the European Commission. Neither the European Union nor the co-financing body is responsible for them.



Thank you!

 **enterprise**
Communications **group**