ERILLISVERKOT

Virve 2.0 mobile strategy

BUILDING SECURITY TOGETHER

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1 Virve will move to new technology in the 2020s

Finnish mobile services are of world-class quality. The data volume per user in Finnish mobile networks is the greatest in the world, and the growth continues. The needs of public safety authorities for wireless broadband have also increased, in line with the development of operational procedures and technology. According to the user survey conducted by Erillisverkot in 2018, approximately 80% of Virve users wanted similar broadband services as available in commercial networks.

ERILLISVERKOT

VISION

Erillisverkot is a forerunner in cooperation between public safety organisations.

MISSION

We enable secure critical operations and communications.

The current Virve network will reach the end of its technological life cycle in 2030. The decision to develop broadband Virve 2.0 services based on the commercial radio networks was made in 2017. As a service operator Erillisverkot will enable more efficient services for authorities. In the Virve 2.0 project, secure and reliable wireless broadband services will be implemented with selected partners for public safety authorities and other organisations. In the migration phase the current Virve will be connected to Virve 2.0.

> The next generation of public safety services in Finland – Virve 2.0, will be a joint effort between Erillisverkot and selected partners. This will safeguard the continuity of daily operations of national critical infrastructure and thus ensure that the public safety authorities can operate smoothly in all situations also in the future."
>
> **TIMO LEHTIMÄKI**
> CEO
> ERILLISVERKOT

2 Virve – the best public authority radio network in the world

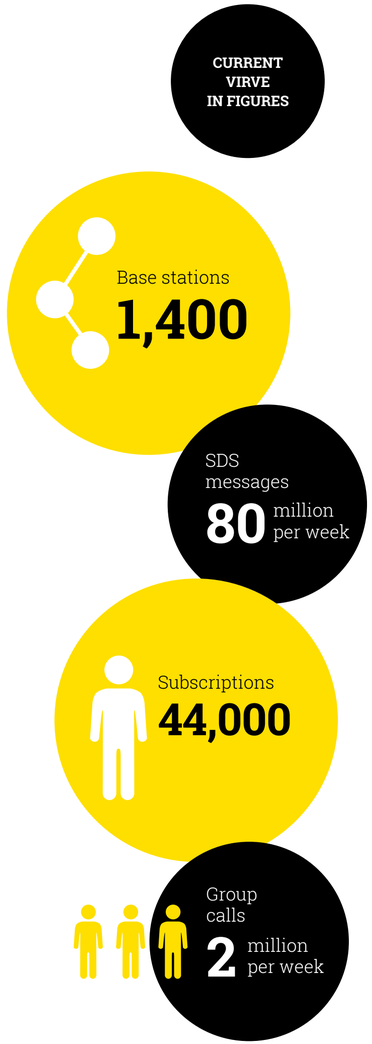
The construction of the current Virve network began in 1998 and the Virve services were taken to operational use in 2002, after the nationwide coverage was completed. The Virve radio network covers almost the whole geographical area of Finland, including territorial waters, and the Gulf of Finland. Virve was the first nationwide public safety Tetra network in the world.

Virve users include public safety authorities and other organisations. Use of Virve is regulated by the following legislation updated in 2019: Information Society Code (917/2014) and the Act on the Operation of the Government Security Network (10/2015). The updated legislation enabled use of the Virve 2.0 services on the commercial mobile networks and incorporated current Virve as a part of the operations of the government security network.

Virve has proven its efficiency in daily operations and in special situations, enabling smooth cooperation between authorities and other organisations. Virve is also used in rail traffic and in other safety and security related functions in the society.

A survey conducted by Erillisverkot in 2018 indicated that 73% of users were satisfied or very satisfied with the current Virve services. In 2017 and 2018 Finland achieved the first place in the comparison of the societies of ten selected countries (Quixoticity Index) highlighting the Finnish unique critical communications ecosystem.

Service agreements of current Virve ensure technical support for Tetra technology until 2030.



According to the customer survey conducted by Erillisverkot in 2018, Virve users prioritise operational needs in field work as follows:

- **89%** Obtaining **information essential to tasks** (maps, images, inquiries)
- **75%** **Quick formation** of common operational picture (operating area, buildings, units and individuals, etc.)
- **73%** **Location of incidents and resources** in the map view
- **72%** **Sharing information** with other authorities and back-office
- **66%** **Reaching staff** in real time for various actions needed
- **37%** Simple **database queries** and report filling
- **22%** **Quick notes in the field**

3 Right information, at the right time, at the right place

Solutions for future public safety communications will be diverse and evolving. Global phenomena and accelerating changes are creating new types of challenges for public safety communication. At the same time, technological development provides even better opportunities to equip users with the communication solutions that best serve them. At Erillisverkot customers come first and we employ methods such as service design to understand their needs, wishes and use cases.

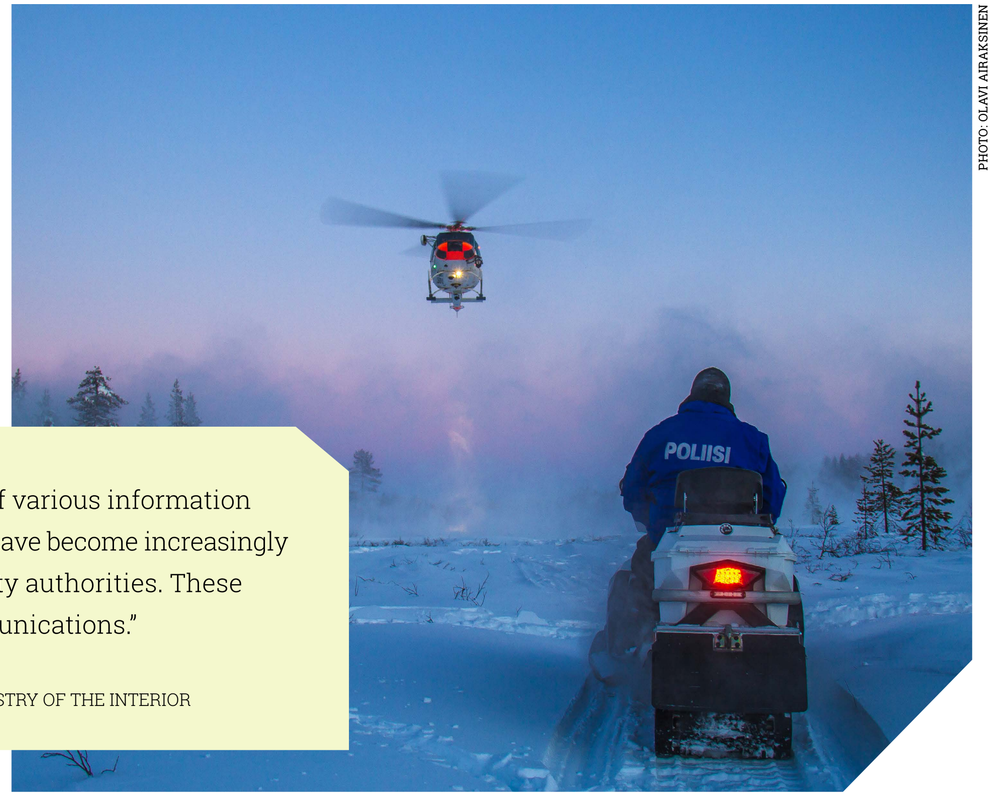


PHOTO: OLAVI AIRAKSINEN

> Real-time exchange of information, use of various information sources and situational awareness needs have become increasingly important in the field work of public safety authorities. These require mission critical broadband communications."
>
> **JANNE KOIVUKOSKI**
> DEPUTY DIRECTOR GENERAL FOR RESCUE SERVICES, MINISTRY OF THE INTERIOR

The operational work of the authorities include daily tasks, such as emergency medical care, rescue, police and border control tasks, as well as larger incidents, such as situations related to extreme weather conditions. In addition to these, there are missions that call for cooperation between several authorities, such as serious accidents with extensive impact as well as natural disasters. All of these duties can be further categorised into urgent, non-urgent and special tasks, which vary in scope, resource needs and nature.

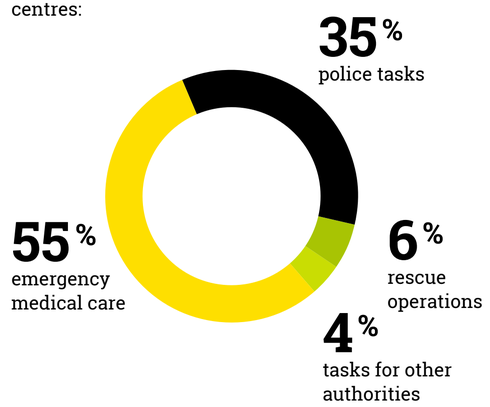
Emergency Response Centres (ERC) in Finland receive an average of 7,400 emergency calls daily. About half of them lead to a task taken by the authorities.

Tasks are distributed in the following areas:

- 55 % emergency medical care
- 35 % police tasks
- 6 % rescue operations
- 4 % tasks for other authorities

In addition, the daily tasks include numerous non-alert tasks, such as intelligence, surveillance and inspection.

Tasks dispatched by emergency response centres:



Dispatched tasks by Emergency Response Centres: 1,392,000 in 2018.
Emergency response centre agency statistics.
Source: 112.fi

Operations of Finnish public safety authorities are characterised by field-based operational management and flexible and efficient co-operation between authorities and other organisations. The various features of the current Virve network enable flexible communication between different parties. An organisation can become a Virve user only if recommended by a public safety authority.

The authorities have different operational roles. Alerted by ERC, team members carry out both urgent and non-urgent tasks. The field staff have efficient tools for communicating and sharing information. Information is also distributed in real time between different authorities and other actors.

Team leaders are in charge of their teams' operations on the scene and they communicate with their team members, ERC, field commander and overall commander.

Field commanders steer operational activities in the field using necessary communication and field management systems. When needed field commander must be able to communicate with all authorities and other actors involved in the incident.

Commanding officers on duty or overall commanders support field operations in their area of responsibility and take on management responsibilities in broader tasks as needed. The tools used by the overall commander provide a real-time common operational picture and enable communication with field commanders and with the senior management.

4 Implementation of Virve 2.0 service

NATIONAL OBJECTIVES FOR VIRVE 2.0 SERVICE
The national objectives defined together with users for Virve 2.0 during the design phase steer the implementation, use and development of the service.

1. MOBILE BROADBAND SERVICE
Virve 2.0 will serve public safety authorities and other organisations critical for security supply and society. It will provide a secure 3GPP-standardised mission critical mobile broadband service with comprehensive geographic coverage based on the selected commercial radio network. The service will be highly available supporting Quality, Priority and Pre-emption (QPP) functions and national roaming. Erillisverkot will manage Virve 2.0 services hosted at its own secure data centres.

2. GROWTH IN NUMBER OF USERS
The deployment of Virve 2.0 services is expected to increase the number of users because new services respond user needs that current Virve has not met. New critical broadband services are seen as essential to enhance operations and increase national safety and security.

3. COST EFFECTIVENESS
Virve 2.0 will be implemented cost-effectively in response to user requirements. The aim is to ensure cost-effectiveness by ensuring that all contracts awarded can be put out to tender at the end of the contract periods.

4. ERILLISVERKOT AS A SERVICE OPERATOR
Erillisverkot will tender for the key elements of Virve 2.0 and implement the service together with selected partners. Erillisverkot is responsible for the integration, production, maintenance and development of Virve 2.0 services.

VIRVE 2.0 SERVICES INCLUDE:
- Mission critical applications (MCPTT, MC Video and MC Data) to replace the current Virve
- Secure and reliable wireless broadband service
- Device ecosystem
- New applications to meet user needs
- Standardized interfaces towards other critical information systems

5. APPLICATION ECOSYSTEM
Erillisverkot will provide versatile mission-critical Virve 2.0 mobile broadband services based on open standards. The services will be developed in close cooperation with the authorities, other organisations and selected application suppliers.

6. VIRVE 2.0 SERVICE ADAPTABILITY
The services will be implemented to support the daily operations of user organisations by adapting services according to the available capacity ensuring optimal service level in all conditions.

7. AVAILABILITY
Virve 2.0 services utilize the capacity and availability of the selected commercial radio network.The availability of capacity for public safety authorities is secured in legislation by defining priority functionalities for critical communication.

In large-scale accidents or demanding operations in sparsely populated areas, coverage and capacity can be improved by tactical base stations installed in emergency vehicles if necessary.

Availability will also be increased by improving indoor coverage and by hardening power supply of critical sites by adding extra battery capacity, and by enabling national roaming if necessary.

8. INFORMATION SECURITY
The Virve 2.0 services will be implemented in compliance with the guidelines described by the national information security board (VAHTI) preventing unauthorised exposure and use of confidential information. The implementation will also ensure confidentiality, integrity and availability of information.

9. VIRVE 2.0 ECOSYSTEM
The Virve 2.0 ecosystem offers a common platform for the future safety ecosystem based on standardised solutions. This will provide compatibility of services with the future pan-European public safety mobile broadband solution.

PRINCIPLES OF THE ECOSYSTEM

10. DEVICE INDEPENDENCE
The Virve 2.0 service can be accessed by 3GPP compliant devices that support priority features for authorities. This allows competition between device manufacturers. Examples of these devices include mobile phones, sensors, computers and routers.

11. INTEROPERABILITY
To make the migration from the current Virve to the Virve 2.0 service smooth, these services will be connected for the migration period. This will support migration to the new service without extensive changes in operational procedures or re-training.

12. STANDARDISED SOLUTIONS
Only 3GPP compliant mission critical solutions will be accepted for use in Virve 2.0. The continuous evolvement of 3GPP specifications will support the development of Virve 2.0 services and features as part of the global mobile ecosystem also in the future.

13. SECURITY OF SUPPLY AND PREPAREDNESS
The Virve 2.0 architecture and the technical solutions used are implemented in such a way that a part or parts of the service can be replaced with solutions from another supplier or transferred to another service provider, if necessary.

Availability of Virve 2.0 service is ensured by the same principles as the current Virve. During emergency conditions, Virve 2.0 service continues to comply with the same availability and information security requirements as specified for the normal conditions.

5 Virve 2.0 services and applications

The Virve 2.0 services will be developed to meet the evolving needs of authorities. Development work is a continuous process done in cooperation with the users. The activities of safety and security actors will be made more efficient when the services utilize new solutions that enable real-time use of data and sharing of information when necessary. Ensuring the reliability and availability of nationwide Virve 2.0 services, as well as the simultaneous development of services, requires the participation of all stakeholders. In addition to the traditional group call, Virve 2.0 will offer a reliable and efficient platform for the implementation of new use cases and services.

Current Virve services that will also be offered as Virve 2.0 services

- Group calls
- Locationing
- Short messages
- One-to-one calls
- Emergency call button
- Dispatcher workstation

The transition to new technology will enable new services, such as:

- Real-time, high-quality video
- File sharing
- Augmented reality applications
- Artificial intelligence
- Internet of Things (IoT)

The Virve 2.0 subscription ensures users

- Adequate capacity
- Service area similar to current Virve radio network.
- Priority functions
- Secure and reliable connections
- Usability during disruptions and emergency conditions (backup power)

SOLUTIONS UTILISING ARTIFICIAL INTELLIGENCE
Video and image analyses, identification of people and automatic license plate recognition enhance operations and support decision-making. These are already part of the everyday life of public safety authorities.

AUGMENTED AND VIRTUAL REALITY
Solutions based on augmented reality can be used in operational activities, real-time control and the provision of various additional information related to tasks. The solutions are expected to generate new innovations in the future to support the operations of the authorities. Solutions based on virtual reality can be used, for example, in training.

IMAGES AND REAL-TIME VIDEO
Images and videos are the basic tools of today's authorities. Virve 2.0 enables the real-time transmission of images and videos from mobile units and drones to field commanders and command & control centres, as well as linking those to various reports and pre-investigation materials.

REMOTE CONTROL, ROBOTICS AND DRONES
Innovations and solutions related to autonomous devices, such as robots, other

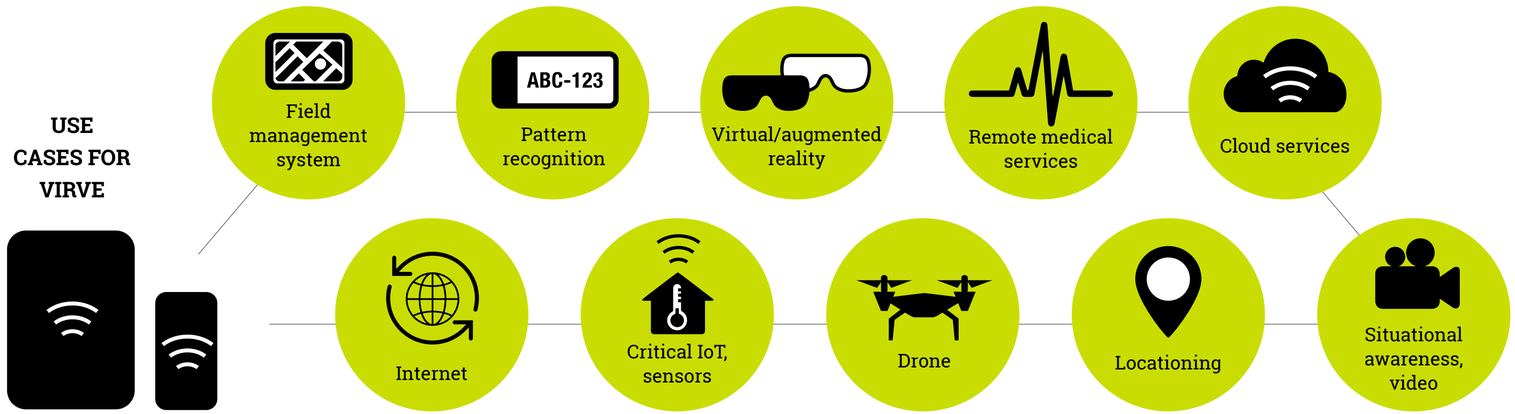


PHOTO: OLAVI AIRAKSINEN

remotely controlled devices and drones will play an important role in enhancing the work of the authorities.

CRITICAL IOT AND SENSORS
In the future, the authorities can gather wireless IoT data from own, open or commercial sources.

TECHNICAL SURVEILLANCE
The authorities use a variety of wireless sensor and surveillance technologies in their surveillance and intelligence operations.

MOBILE OFFICE
The authorities use various types of vehicles in their operations. Following technological development, vehicles have been equipped with tools that optimally support operations and that use reliable mobile broadband data connections. With the development of technology vehicles are equipped with optimal tools for operative field work that rely on secure and reliable mobile communication connections.

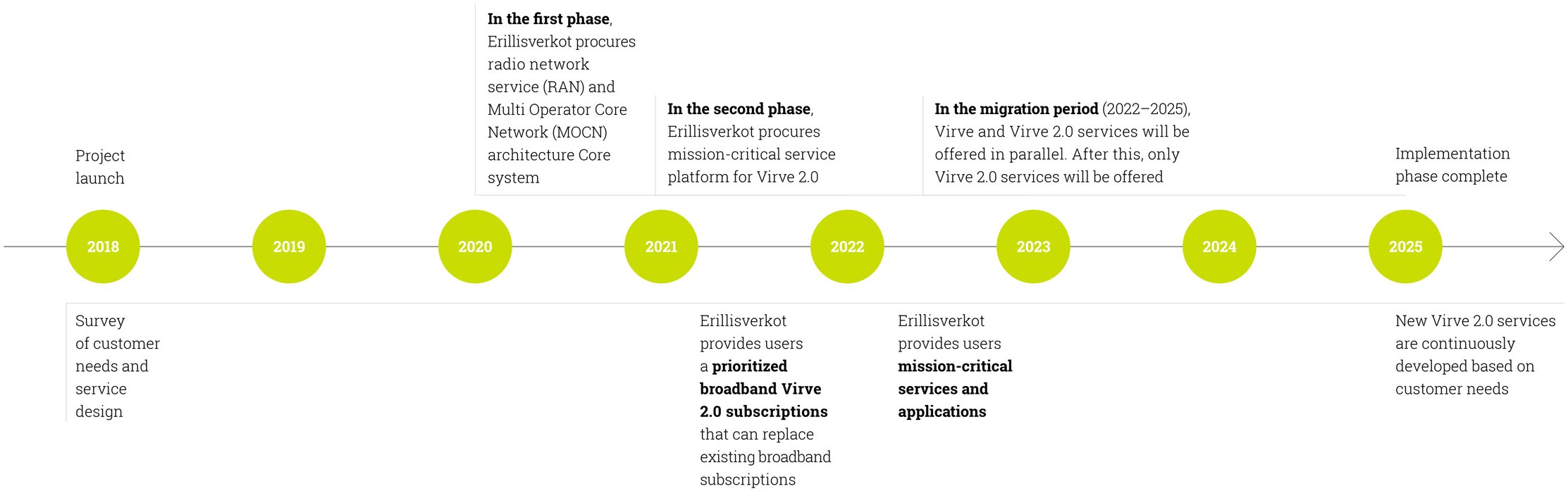
USE OF INFORMATION RESOURCES
Authorities use cloud services that are available after the introduction of Virve 2.0 services regardless of time, place or device used.

TELEMEDICINE
Tools and services designed to enhance the communication between paramedics, doctors and other medical personnel of health care will improve health care processes.

FIELD MANAGEMENT SYSTEMS, SITUATIONAL AWARENESS AND POSITIONING
The basic elements of authority operations include field management systems, locationing, statuses, situational awareness and other solutions which require reliable data connections and end user devices.

Virve 2.0 services constructed in phases

PROJECT ROADMAP:



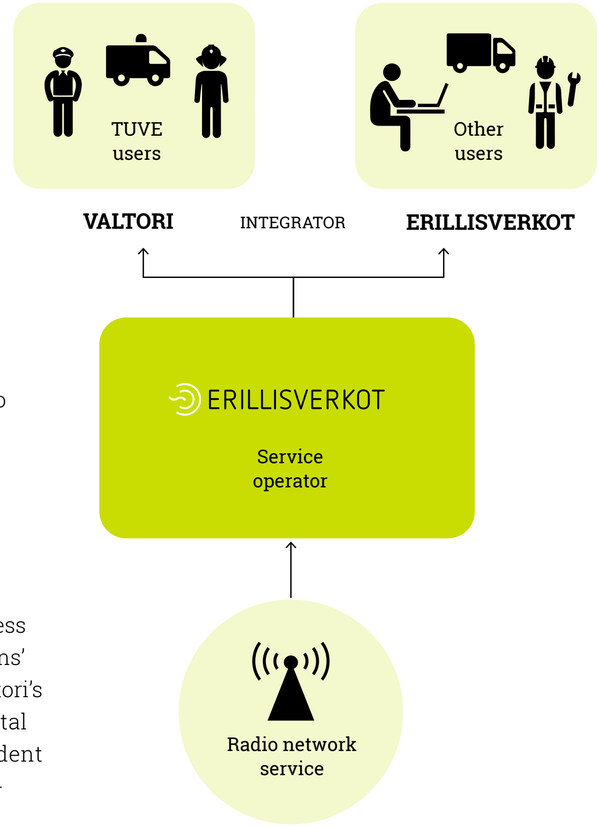
VIRVE 2.0 SERVICE PROVIDER AND INTEGRATOR

As the service operator, Erillisverkot provides, maintains and develops Virve 2.0 services and ensures that the safety and preparedness requirements for services are met under all circumstances.

The Government ICT Centre (Valtori) is the integrator for organisations obliged to use the governmental security network, and Erillisverkot is the integrator for other organisations. The integrator's task is to integrate the broadband subscription, the device and selected services.

With Virve 2.0 subscriptions, users get access to Virve 2.0 services, their own organisations' services and approved public services. Valtori's customers can also use other governmental security services (TUVE), sector-independent governmental services (TORI) and sector-specific governmental services (TOSI).

VIRVE 2.0 SERVICE PROVISION



6 Migration to Virve 2.0 services

User organisations will prepare for the of Virve 2.0 with Erillisverkot. User organizations are preparing for the implementation of Virve 2.0 in cooperation with Erillisverkot. Testing and piloting will be carried out prior to service launch. Organization-specific readiness for implementation is based on joint planning and close cooperation.

After implementation, the development of services will continue in close cooperation with user organizations. Emerging technologies will be monitored and customers' needs will be actively surveyed during the development work by Erillisverkot.

The implementation of Virve 2.0 requires adequate resources from both the user organisations and Erillisverkot. The migration to the Virve 2.0 service can begin once the user organizations have accepted the service.

PHOTO: JANNE MIKKILÄ

Joint use

The current Virve will operate in parallel with Virve 2.0 services until all the user organisations have migrated to the new service.

7 International cooperation guarantees continuity

The implementation of Virve 2.0 is based on international standards and technologies, which enables cooperation between Virve 2.0 users and their counterparts in other countries.

Erillisverkot actively participates in standardisation and various other international cooperation forums. Cooperation forums agree on common operating models and goals for standardisation as well as on requirements for equipment suppliers and other industry.

The current Virve network is connected to the Swedish (RAKEL) and Norwegian (Nødnett) authority networks, which allows for the use of joint talk groups between authorities across borders. Virve 2.0 will support this collaboration also with mission critical broadband services.

Erillisverkot participates in the Broadway project funded by the EU's Horizon 2020 framework programme. The project's goal is to provide a broadband solution enabling collaboration between European authorities.

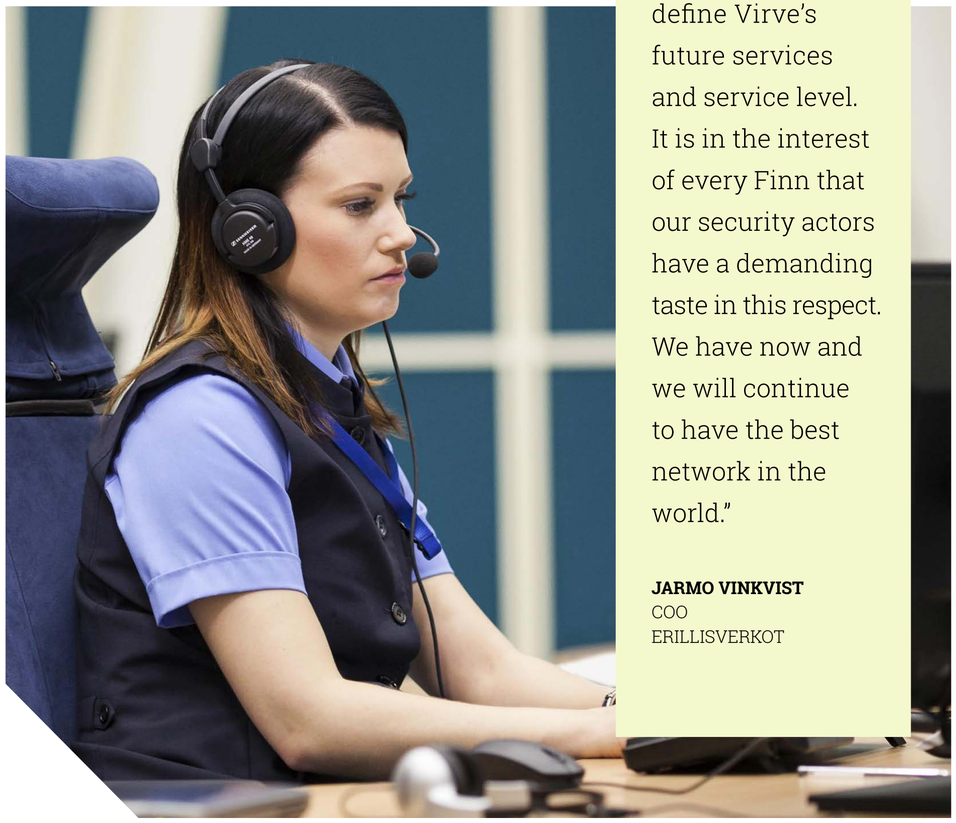


PHOTO: EMERGENCY RESPONSE CENTRE ADMINISTRATION

> All key authorities and other actors define Virve's future services and service level. It is in the interest of every Finn that our security actors have a demanding taste in this respect. We have now and we will continue to have the best network in the world."
>
> **JARMO VINKVIST**
> COO
> ERILLISVERKOT