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POSSIBILITIES OF UNIFIED DIGITAL RADIO-SYSTEM IN THE TELECOMMUNICATION NETWORK OF THE HUNGARIAN DEFENCE FORCES II

Absztrakt/Abstract

A cikkfolyam második, befejező részében a mobil bázisállomással történő hálózatkiterjesztés lehetőségeire kívánok kitérni, rámutatva hálózatmenedzsment lehetőségeire és korlátaira. Az SDS információk talán leghatékonyabb kihasználása a rendvédelmi szerveknél valósul meg a rendszám azonosítás terén, de őrzésvédelmi és járőrtevékenység során a Magyar Honvédség is kiválóan alkalmazhatja.

Az AVL információk kezelése jelenleg nem kap elég figyelmet a zártcélú használat során, pedig kiváló lehetőségeket nyújt mind békeidejű alaprendeltetési feladatok (pl. futárszolgálati, pénzkísérati), mind pedig katasztrófavédelmi feladatok során.

In the second, concluding part of the article, I will demonstrate some possibilities of the expansion of the network, consideration also the drawbacks of the network management system. Most probably, the most efficient use of the SDS system is within the police organizations, in identifying registration numbers, but the Hungarian Defence Forces can also employ this system in providing security and patrolling activities. At present, handling AVL information is not widely considered in the use of closed purpose networks, although it offers excellent application possibilities both in the area of peace time basic tasks (like courier/messenger) or money escort services as well as in the area of disaster relief or patrolling tasks.

Kulcsszavak/Keywords: EDR, TETRA, menedzsment, hálózatfelügyelet, infokommunikáció ~ UDR, management, network management, infocommunication

Introduction

In the first part of the article I outlined the principles of establishing the efficient management structure integrated into the network management system of the Hungarian Defence Forces. In my opinion, taking into consideration the rising number of the users and the higher service expectations, the presented structural outline enables a more efficient use of the network. I also pointed out the new possibilities offered by the Unified Digital Radio-system (UDR) system in the domestic/national speech oriented transmission, giving some examples in the framework of the present management system.

In the second, concluding part of the article, I will demonstrate some possibilities of the expansion of the network, considering also the drawbacks of the network management system. Most probably, the most efficient use of the SDS¹ system is within the police organizations, in identifying registration numbers, but the Hungarian Defence Forces (HDF) can also employ this system in providing security and patrolling activities.

At present, handling Automatic Vehicle Location (AVL) information is not widely considered in the use of closed purpose networks, although it offers excellent application possibilities both in the area of peace time basic tasks (like courier/messenger) or money escort services as well as in the area of disaster relief or patrolling tasks.

SDS-based data transmission and management

In field communication conditions, SDS messages can be effectively applied for example in checkpoints or during patrolling to check car registration numbers or personal identity cards, as well as for sending instructions by the local dispatcher. In this process, the SDS messages get connected to information in the server database that provides the necessary information, the operation of which can also be managed.

¹ SDS – Short Data Services

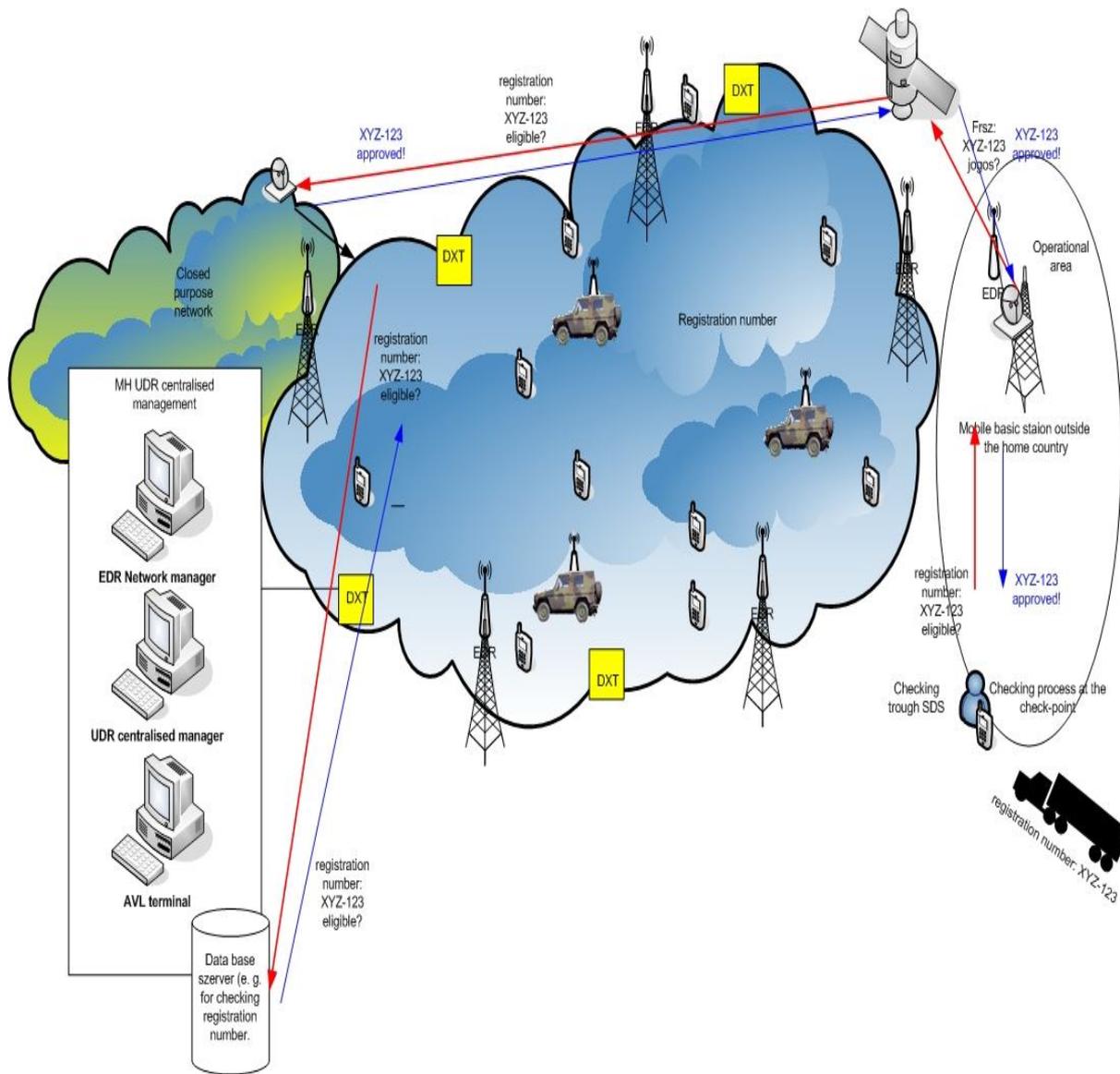


Figure 1. Applying data server via SDS

The Tetra terminal is suitable for IP-based data transmission from the device connected to its interface (e.g. from a PC or PDA).

Although the Hungarian Defence Forces have not yet tested this kind of transmission possibility in field conditions, the IP² data transmission can be very useful in field communication. In this usage the message is sent in IP packets, with the priority of voice service. At present, the HDF only use SDS data transmission. The full extent application of this method is well illustrated by the checking system of registration numbers tested presently by the police forces. For the HDF, the best choices of SDS messages can be the group instructions sent by the dispatcher (e.g. „Immediately return to base.”) or a search version of a database (e.g. security), when the patrol at the checkpoint can check registration numbers or personal IDs from a central database with the use of SDS. This means is also suitable for the central dispatch of certain measured data, e.g. the level of toxic pollution of a material.

² IP – Internet Protocol

The IP-based data transmission is suitable for sending regional data on-line (with low resolution pictures). At present, however, the low data transfer speed is still an obstacle.

It is important to know that the UDR and the GSM³ systems can be alternatives in certain situations. As a conclusion, it is worth testing and -if proven successful- acquiring these devices.

Mobile basic station and its management

Outside the national area the device can be used in missions or in international exercises. But at the moment we cannot plan its usage in the UDR infrastructure of other countries, but, as an alternative, we can provide telecommunication suitable for field conditions with the combination of VSAT⁴ connection and mobile basic station. Its international use needs proper validation.

Service providers offer solutions that can be mounted on the vehicle and that provide non-stop energy supply and overall management and are capable of receiving VSAT connection. It is, however, recommended that their technical capabilities should be tested prior to purchasing them. The satellite bandwidth and antennas that we are currently renting are suitable for testing these devices.

If the devices prove to be suitable after these test, it is recommended that they should be owned, or if this is not possible, a mobile basic station, should be leased /rented for a long term to provide coverage not only nationally and to have complete connection and management with the national network.

³ Global System for Mobile Communications

⁴ Very Small Aperture Terminal

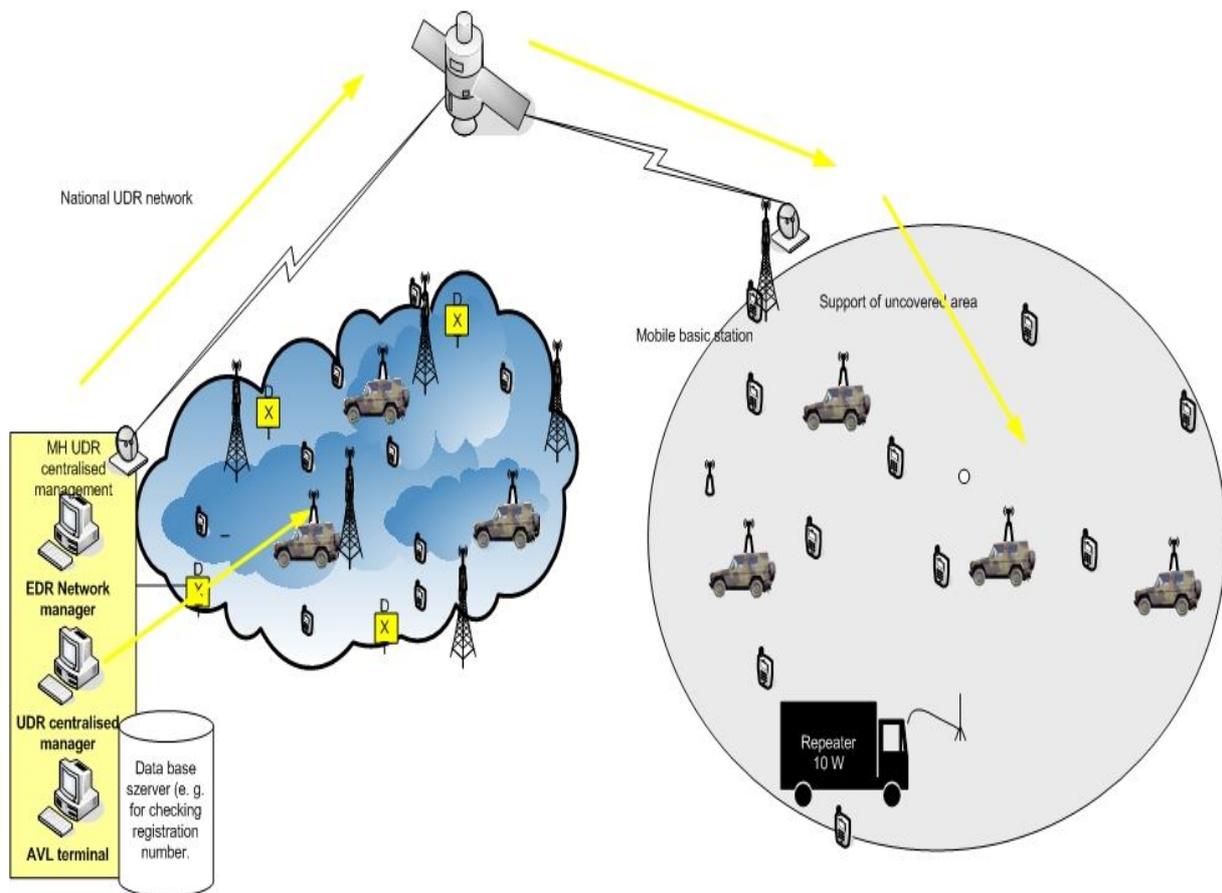


Figure 2. Foreign mission with network management

When the device can be purchased for ownership, it is advisable to outline a list of requirements for a tender based on the VSAT and UDR requirements of the civil service providers and of the high energy supply mobile, mountable devices integrating analogue radio interface.

AVL

The network management staff can monitor the technical data and the transmission of the groups and by the use of the AVL can continuously obtain data about the location of the devices. They can also take the necessary measures in due time in case of emergency calls or other events. The satellite-based location in the UDR system is done in the following way: the data of the GPS⁵ enabled devices are transmitted via satellite to the AVL server farm located on the area of the service provider and the through the TCS server and the switchboard centre to the AVL end point.

⁵ GPS - Global Positioning System

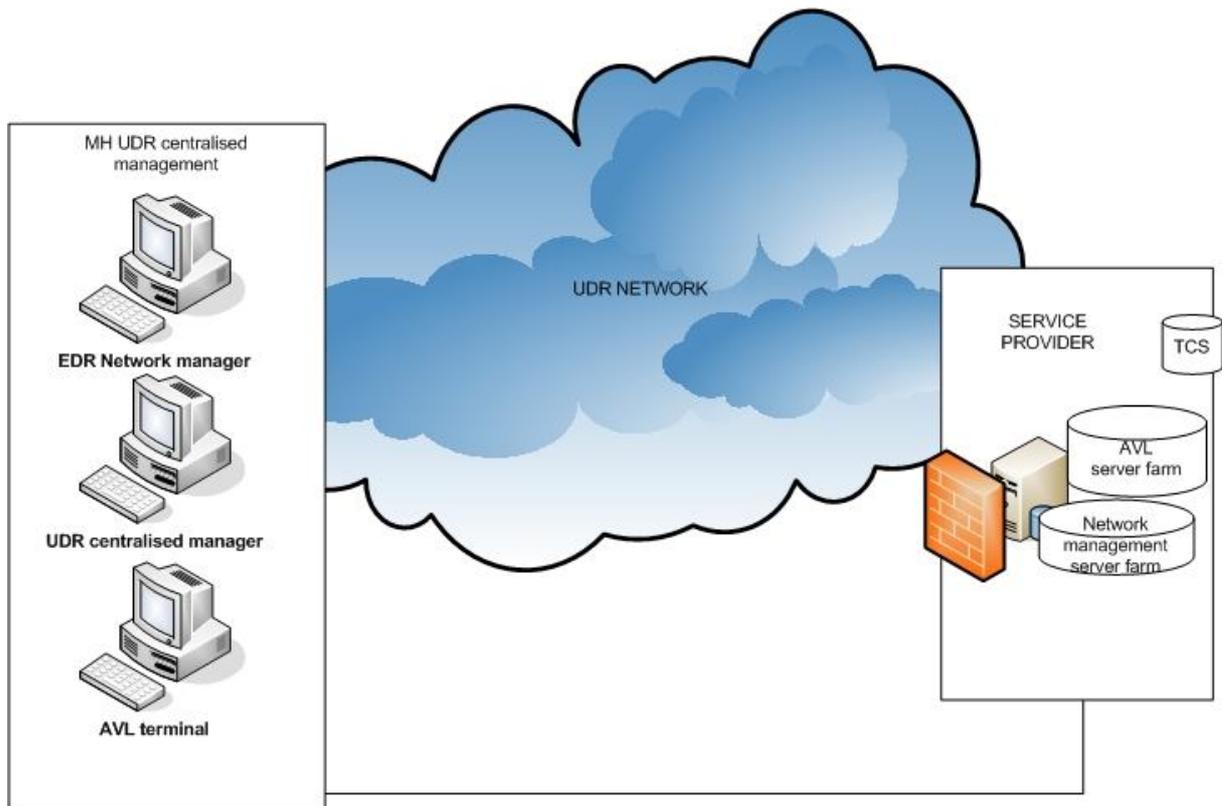


Figure 3. AVL management

One of the AVL terminals must be situated in the central network management centre. To be able to monitor the operational activity, it is recommended that one terminal should be situated in the MH MK⁶ or, in case of a mission outside the national territory, in the operational centre. This way the AVL work stations make it possible to monitor the GPS devices and also to plan patrol or escort routes and to receive alarm signals, as well as to check any unforeseen activity, attack or accident.

Some of the Tetra devices support the traditional radio location positioning, which is highly cost effective as there is no need to purchase GPS-enabled devices. On the other hand, it is less accurate. Accuracy with this means is provided by the density of the basic stations. If the HDF are planning to use this means, it is advisable to place the positioning server under their own supervision/management. Contact with this means can be done through SDS and status messages from terminal devices.

Possible Difficulties

Regarding the application of switchboard centres and basic stations in telecommunication in the operational area, it may be strange that they are owned by the contracted service provider. At present, the access to the configuration of switchboard centres is not allowed by the management staff of the HDF. Although article 4 paragraphus 1.e. of the 109/2007.(V.15.) Government Decree about the unified digital radio transmission system says that the network owner is allowed to coordinate the cooperation of the Service Provider and of the User in emergency conditions, the special regulation about the use of electronic data communication

⁶ MH MIK – HDF Operational Centre

in emergency conditions as well as about the functions of the state governmental organisations says that the devices providing coverage are in many cases placed on buildings of certain companies. Such buildings are not always possible to access for troubleshooting. Even following a biological disaster, or any other emergency situation, accessing these buildings can greatly differ from the usual everyday access conditions. In case of an emergency situation, it is not acceptable that the telecommunications infrastructure is exposed to damage or that it is difficult to have access to it for repair. As a consequence, the UDR application of non-peace time is not primarily recommended due to the above mentioned conditions. If the radio infrastructure has suffered serious damage, the application of repeaters seems to be a good solution to provide partial telecommunication coverage as repeaters work on two different radio frequencies and they can transmit the signal through the mobile basic stations in also more difficult terrain conditions.

The present VPN management eligibility enables the network management to programme the device and form groups but at the moment the HDF is not entitled to check the network technology or on-line monitor the trouble shooting process. But in the simulation of telephone exchange failure, the problem is that the dispatcher on the failed switches are eliminated together with the groups and conveying them to another centre takes three hours, during which period the respective devices can only communicate in indirect mode of operation. This time interval can be too long in field communication conditions, when the UDR system provides highly important communication.

For the higher security of communication service in operational communication, the HDF should acquire a mobile UDR switchboard centre following the necessary approval. This centre, combined with a mobile basic station and a repeater, could form an attachable network section. This would enable the safe use of the UDR transmission in mission conditions and would guarantee the necessary data security, continuous maintenance and complete technical supervision.

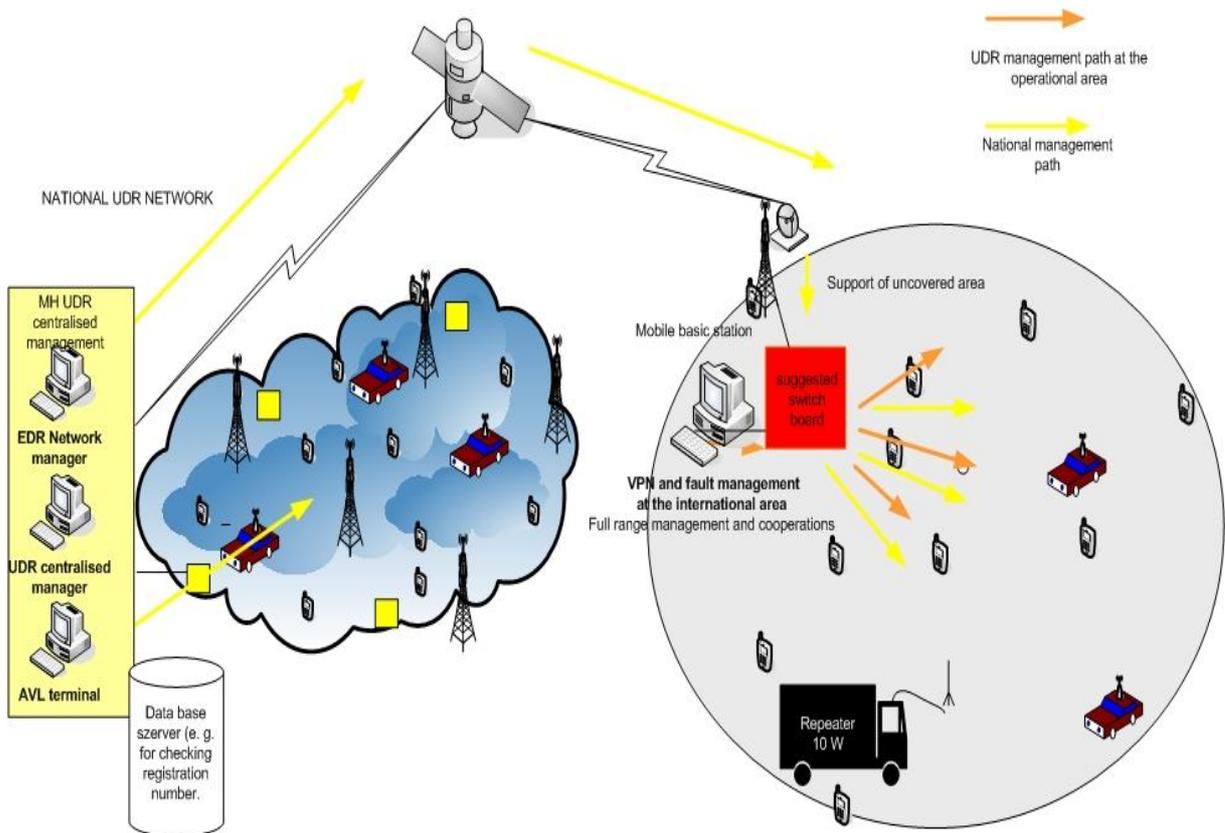


Figure 4.

In operational communication conditions or operative TETRA communication it is advisable to consider ordering and transmitting the AVL information to the AVL clients on a server park that is owned and operated by the HDF. With the present situation, the locating coordinates that often contain highly secret information are stored by the system of the provider, and then together with the map information, they are sent to the AVL terminals. It would be recommended to establish an HDF-owned equipment park to provide the highest security of the information.

Cryptography

Especially in mission activities and special tasks, cryptographic capabilities permitted by the decree could serve well. The encryption software for license devices can be purchased by the piece but within the purchased license number it can be freely regrouped. This makes it possible for the HDF to cost-effectively procure only a few tens of coding softwares and apply them at the most needed task based service users. This could establish the HDF closed purpose stationer and field communication system allowing the high security UDR transmission.

Summary

After renting/leasing or procuring and owning a mobile basic station by the HDF, the management staff will be able to expand and cover networks with high efficiency combining it with repeaters or, after approval for operation outside the borders of the country, with satellites. At the same time, this could provide the supervision of vehicles or GPS enabled devices at the management workstations. The installation of AVL workstations to the HDF Operational Centre or to missions is also possible. However, at the moment, the server farm is to be found at the station of the Provider. If the legal possibilities allow it, it is recommended that the HDF should procure upgradeable hardware and software, which later on could provide surveillance of e.g. patrolling activities or research and would give high level security features.

In field communication conditions, the application of the SDS messages of the UDR technology is also recommended as it enables efficient data supervision from a central database and transmission can also be efficiently performed. In international areas, like the UN, OSCE, NATO missions, the UDR services can be efficiently used in areas where the activity of the deployed group needs them. The connection to the national closed purpose network is done by more direct means (e.g. by satellite) as these enable efficient management.

The communication coverage by mobile basic station is greatly suitable for partial field communication purposes as it can easily connect to the national/home network by microwave transmission, in the homeland and by satellite connection abroad. This results in a segment that can be monitored and configured.

With infocommunication needs abroad, it is advisable that a HDF-owned switchboard centre is connected following the necessary approval. After procuring a mobile basic station, this centre could operate its own network and its complete management both in the operational area and peace support/keeping operations.

In conclusion, the UDR can be efficiently used in field communication. At the moment, however, it is partially managed for basic capabilities by the HDF, and it can also be used together with the present equipment for not operational communications. To satisfy higher needs, following the failure of the basic network, a HDF-owned switchboard centre and its complementary infrastructure would be more suitable for the provision of services free /independent of a Service Provider.

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