Informal document WP.5/GE.3 (2019) No. 4

Distr.: General
23 January 2019

English only

Economic Commission for Europe

Inland Transport Committee

Working Party on Transport Trends and Economics

Group of Experts on Climate Change Impacts and Adaptation for Transport Networks and Nodes

Sixteenth session
Geneva, 29 and 30 January 2019
Item 4 of the provisional agenda
Discussions on the final report of the Group of Experts

Main transport networks and nodes

Note by the secretariat

I. Introduction

1. This document provides draft text for section 3 of chapter 2 (Climate information and infrastructure networks and nodes) of the final report. The Group of Experts will be invited to discuss this document and make suggestions and give directions for its further elaboration for the final report.

2. This document presents the main transport networks and nodes in ECE region and their availability in geographical information system (GIS) environment. It also provides information on the use of the networks. It hence shows how critical these networks are to an effective functioning of markets which depend on them.

II. Roads

A. E roads

3. The road network in UNECE region has been developed in the framework of the European Agreement on Main International Traffic Arteries (AGR). The Agreement was done at Geneva on 15 November 1975 and entered into force on 15 March 1983. It lays down a coordinated plan for the construction and development of roads of international importance, the E roads network.

4. The Agreement distinguishes between the reference roads and intermediate roads. The reference roads, also called class-A roads, have two-digit numbers assigned. Branch, link and connecting roads, also called class-B roads, are numbered with three digits.

5. The Agreement also classifies road as per their geographical orientation. North-south orientated reference roads have two-digit odd numbers terminating in the figure 5 and increasing from west to east. East-west orientated reference roads have two-digit even numbers terminating in the figure 0 and increasing from north to south. Intermediate roads have respectively two-digit odd and two-digit even numbers comprised within the numbers of the reference roads between which they are located. Class-B roads have three-digit numbers, the first digit being that of the nearest reference road to the north of the B-road concerned, and the second digit being that of the nearest reference road to the west of the B-road concerned; the third digit is a serial number.

6. The E roads network has been put into GIS environment by UNECE, using open source data coming from OpenStreetMap (figure 1). The accuracy and correctness of the geographical location of E roads presented in the map rely therefore on this data source. Basic data verification has been done to compare the E roads network described in the Agreement with the network available in OpenStreetMap data, however gaps may subsist: the Agreement describes the roads as chains of cities, without giving information on the paths which connect these cities.

7. The OpenStreetMap data has been downloaded from Geofabrik[1] for Europe and Asia. The package data has been then extracted and filtered[2] in order to keep only motorways, primary roads and trunk roads, containing reference to “E roads” in their attributes (field “int_ref”).

[1] http://download.geofabrik.de/

[2] Using osmfilter.exe. Command line given here as example for a file named “fr.o5m”: osmfilter fr.o5m --keep= --keep-ways="(highway=motorway =primary =trunk) and int_ref=*E*" --keep-tags="all highway int_ref" -o=fr.osm

Figure 1 - The E road network (source: UNECE)

B. Traffic flows on E-roads

8. The traffic on the E-roads in measured by means of a census by UNECE. Such census is undertaken every five years. With the census the annual average daily traffic data is collected. This data serves as a possible indicator defining the criticality of the transport network (figure 2).

9. The three last censuses related to E roads, in 2005, 2010 and 2015, are presented in this study. The data are collected for individual segments as defined by the member State, on the basis of the standards set out in Annex II to the Agreement. These data include infrastructure information such as number and size of lanes, and traffic information measured in Annual Average Daily traffic (AADT as total volume of vehicle traffic of a highway or road for a year divided by 365 days)) for all vehicles as well as specific vehicle categories (motorized two wheelers, passenger cars and light goods vehicles, goods road vehicles, and buses and coaches).

10. The geographical location of the counting posts for sections of roads is communicated by the ECE member States in their answers to the census questionnaire, and the traffic flows figures are those measured at those counting posts. In consequence, the resulting map does not always show road segments that line up perfectly to the real

network. It shows instead straight-line paths between counting posts. Moreover, the map represents data as collected by member States. In some cases, traffic counts have only been conducted on specific points and not on every segment, which creates missing segments.

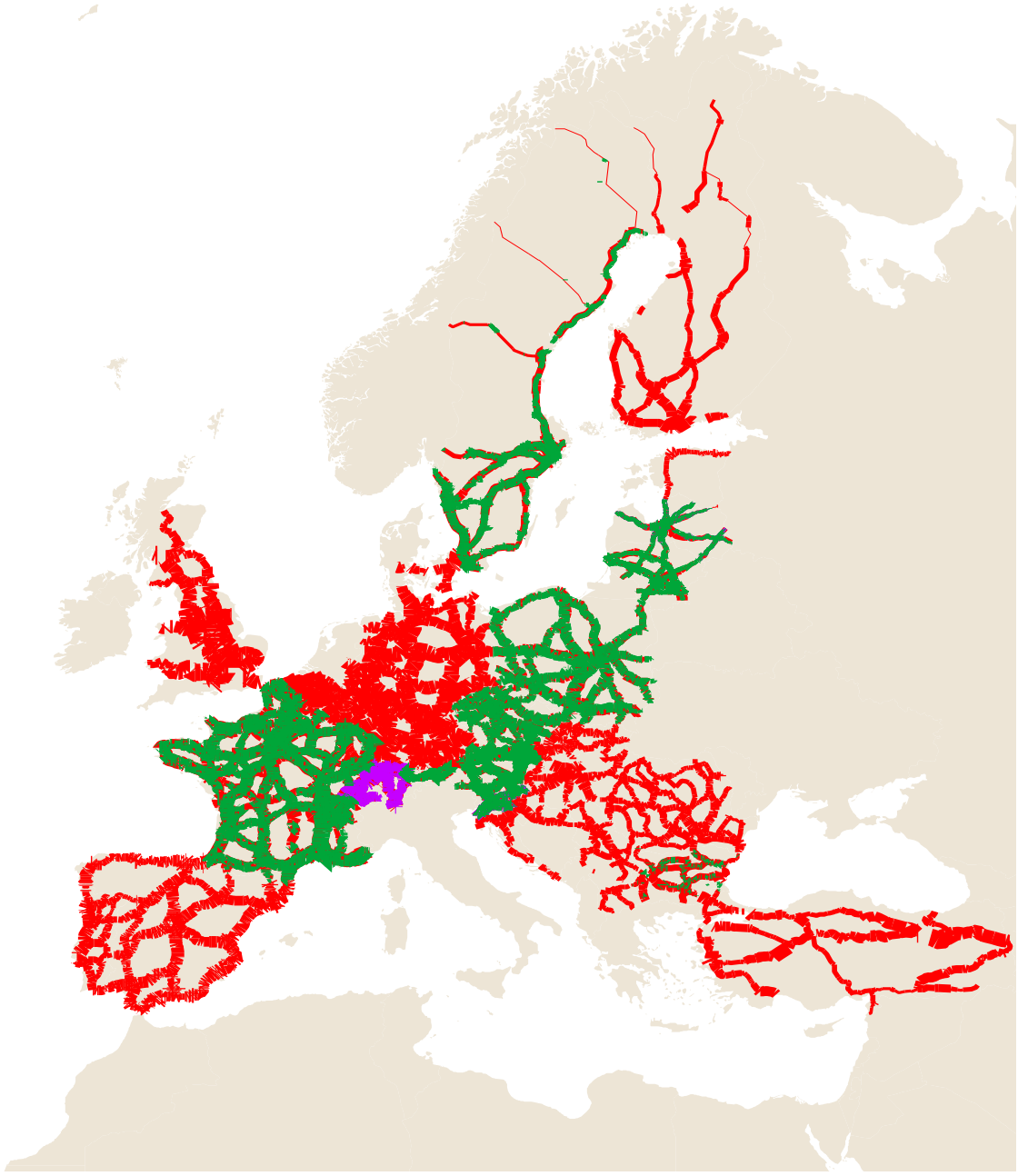

Figure 2 - The E road network censuses: AADT for 2005 (red), 2010 (purple) and 2015 (green) (source: UNECE)

C. E-roads analysis

11. The E-roads constitute a dense network except from the northern and eastern parts of the region (see figure 1). Any disruption in these geographical locations can be critical and have negative socioeconomic impacts. Disruptions in the locations where the network is dense may be potentially minimised by moving the traffic to alternative roads available in close proximity. Nonetheless, if a disruption on an important artery would persists, this may cause a disruption chain-effect as one disruption may lead to disruption of other roads which may not be able to absorb the redirected traffic. Hence, persisting disruptions, even on the dense network, may have negative socio-economic impacts.

[This part is to be further developed as per advice of the Group of Experts]

III. Railways

A. E rail network

12. The rail network in UNECE region has been developed in the framework of the European Agreement on Main International Railway Lines (AGC). The Agreement was done in Geneva on 31 May 1985 and entered into force on 27 April 1989. It identifies railway lines of major international importance, the E rail network. It also provides the technical characteristics as a basis for further development of the European railway infrastructure.

13. The E rail network has not been yet fully geo-coded and so is not available in GIS environment. For this study, data from the Trans-European Transport Network (TEN-T)[3] (figure 3) and the EuroGlobalMap (figure 4) are used. The TEN-T network is a European Commission policy directed towards the implementation and development of a Europe-wide network of roads, railway lines, inland waterways, maritime shipping routes, ports, airports and rail-road terminals. The Trans-European Rail Network is made up of the Trans-European high-speed rail network as well as the Trans-European conventional rail network. The map is available from the European Commission.

14. The EuroGlobalMap is a 1:1 million scale topographic dataset covering 45 countries and territories in the European region. It includes the TEN-T network but there is no data for Belarus, the Russian Federation, Turkey and some of the Western Balkans countries. It has been downloaded from the EuroGeographics website. [4]

[3] For more information, see ec.europa.eu/transport/themes/infrastructure_en

[4] For more information, see eurogeographics.org/products-and-services/open-data/. © EuroGeographics. Original product is freely available at eurogeoarchive.srgry.uk. Terms of the licence available at http://eurogeoarchive.srgry.uk/form/topographic-data-eurogeographics

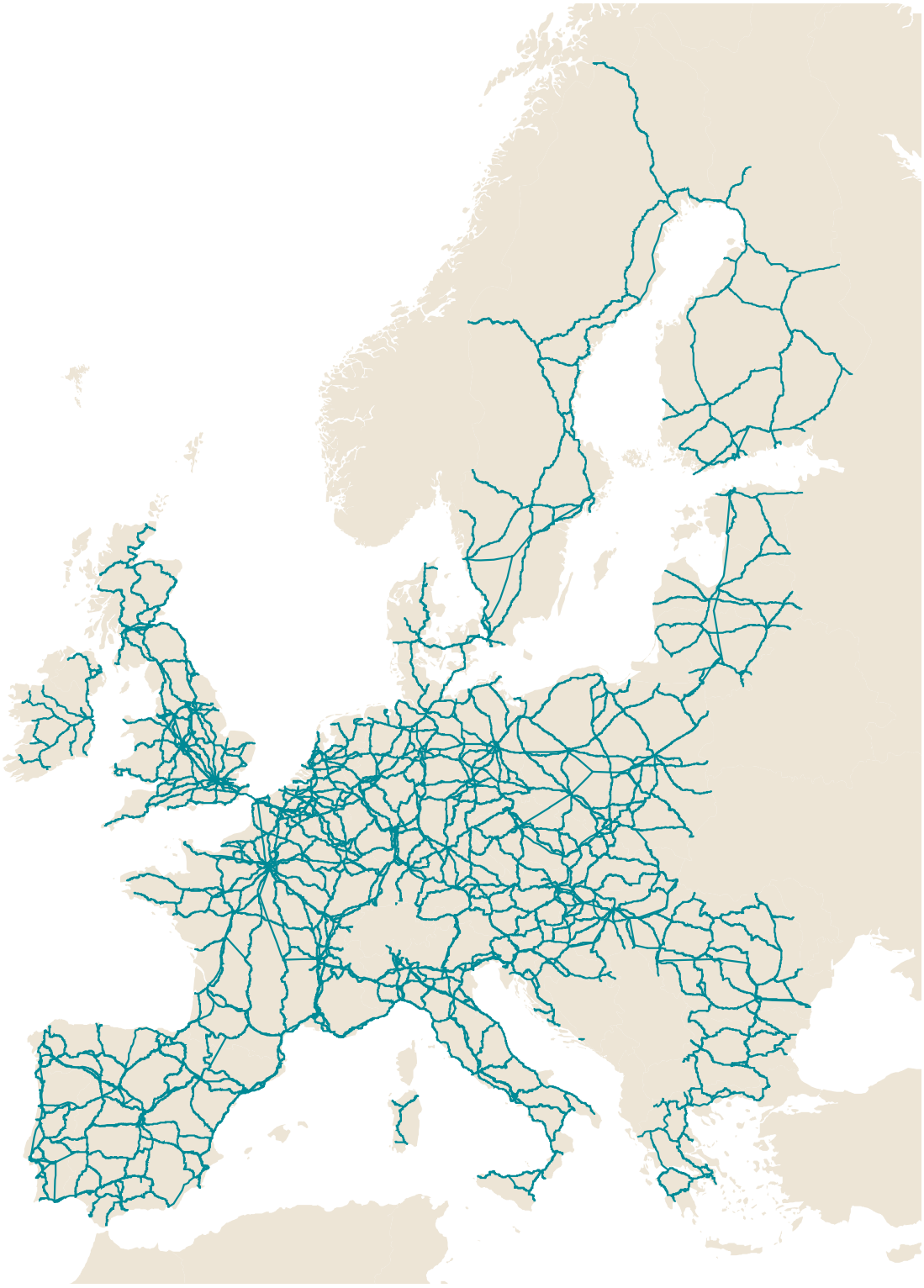

Figure 3 - The TEN-T rail network (source: European Commission)

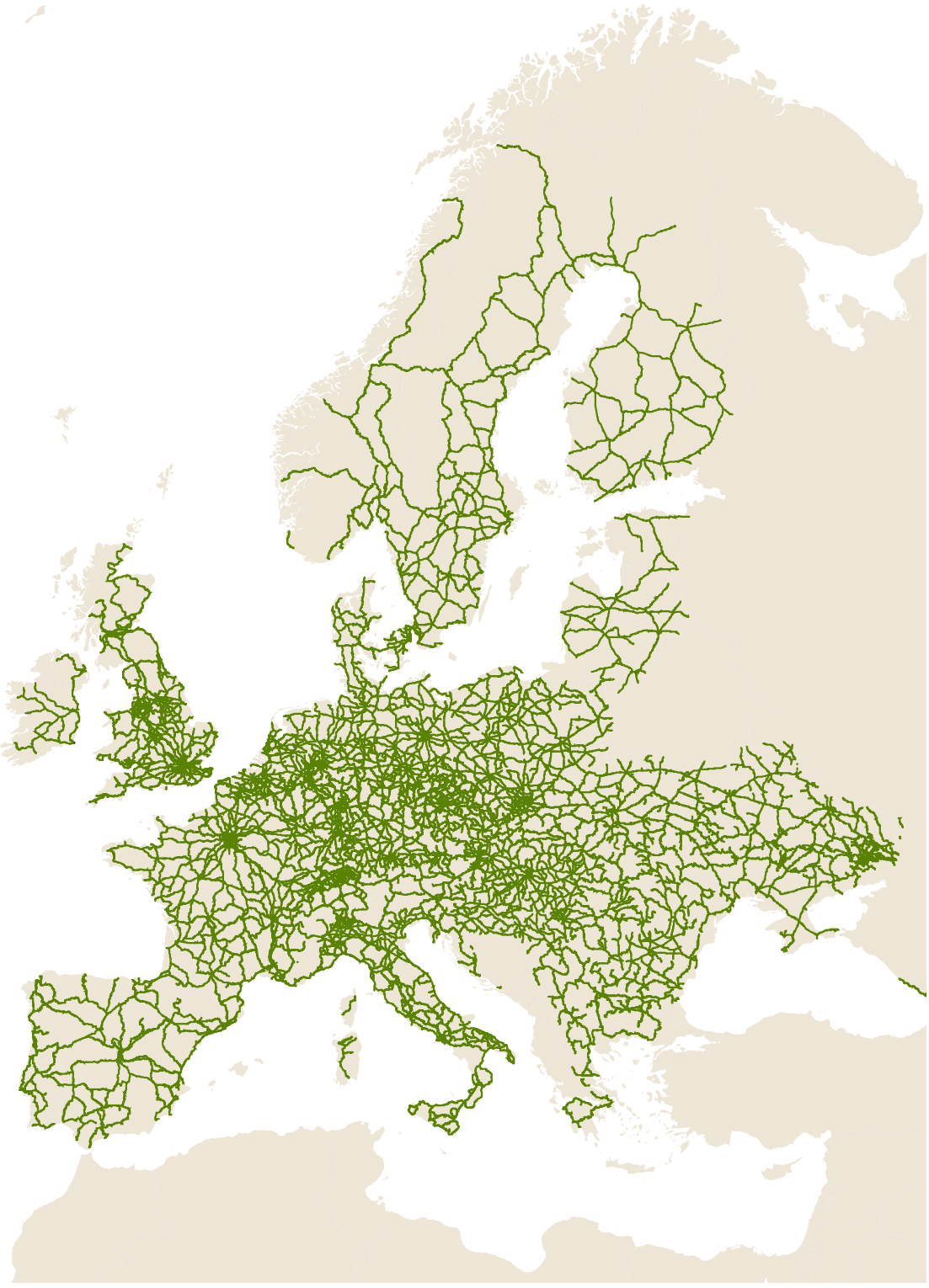

Figure 4 - The EuroGlobalMap rail network (source: EuroGeographics)

B. Traffic flows on E rail network

15. As for E roads, to respond to new data requirements and changes in traffic patterns, censuses related to the E rail network are conducted by UNECE. Information on the extent to which various types of trains use different segments of the railway tracks enables improved land use management and better integration of rail traffic in the planning processes of the country itself, as well as at the international level, allowing for adequate maintenance, renewal and improvement programmes. This information also contributes to finding solutions to the problems raised by traffic congestion and facilitates the study of environmental issues, rail safety and energy consumption. Such censuses are undertaken every five years and for the purposes of the coverage of the E-Rail Censuses, the rail network to be considered consists of lines that are included in Annex 1 of the AGC, lines that are included in the European Agreement on Important International Combined Transport Lines and Related Installations (AGTC) of 1991 and lines in the Trans-European Rail Network.

16. Two categories of trains are counted: passenger trains and goods trains. For each E-railway line in a ECE member State, the annual number of trains, per network segment, by direction and by train category is recorded. This data serves as a possible indicator defining the criticality of the transport network (figure 5).

17. The accuracy of the network presented depends on the geographical location communicated by the ECE member States in their answers to the census questionnaire. As for road census, the rail census map doesn’t always show rail segments that line up perfectly to the real network and shows instead straight-line paths.

Figure 5 - The E rail network censuses: number of trains (transport of goods) (combined for 2005 and 2010) (source: UNECE)

C. E-rail network analysis

[This part is to be developed as per advice of the Group of Experts]

IV. Waterways

A. E waterway network and ports

18. The waterway network in UNECE region has been developed in the framework of the European Agreement on Main Inland Waterways of International Importance (AGN). The Agreement was done in Geneva on 19 January 1996 and entered into force on 26 July 1999. It establishes a plan for the development and construction of E waterway network and covers inland waterways, coastal routes and ports of international importance.

19. The European Inland Waterways of international importance are those belonging to classes IV to VII. The class of a waterway is determined by the horizontal dimensions of motor vessels, barges and pushed convoys, and primarily by the main standardized dimension, namely their beam or width. Main inland waterways which follow mainly north-south direction providing access to sea ports and connecting one sea basin to another are numbered 10, 20, 30, 40 and 50 in ascending order from west to east. Main inland waterways which follow mainly west-east direction are numbered 60, 70, 80 and 90 in ascending order from north to south.

20. The E waterway network and ports have been put into GIS environment by UNECE (figure 6). Additional data from the UNECE Inventory of Main Standards and Parameters of the Waterway Network (Blue Book) is also included and offers an inventory of existing and envisaged standards and parameters of E-waterways and ports.

Figure 6 - The E waterways network (waterways and ports) (source: UNECE)

B. Traffic flows on E waterway network

21. Currently there is no public data available on E waterways traffic flows. Nevertheless, the Working Party on Inland Water Transport considered the collection of inland waterway traffic data through a census similar to those existing for E roads and E rail network at its meeting in 2018. It was planned that the census could be held in 2020. In addition to AADT, particularities of inland waterways could be taken into account, such as their seasonal nature, low water periods or other periods when navigation is stopped or hindered. This information could also contribute to the modal shift from other inland transport modes and facilitate the study of environmental issues, safety and energy consumption of inland water transport. An additional objective of the E-Waterway traffic census would be the measurement of the performance of the waterway network, expressed mainly in tonne-kilometres, by the different types of vessels counted.

C. E waterway network analysis

[This part is to be further developed as per advice of the Group of Experts]