**PERCEIVING TELECOMMUNICATIONS NETWORK IN THE CONTEXT OF TRANSPORTATION SYSTEM**

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1. Abstract.

*The concept of the term, Transportation System, draws attention to the movement over geographical space and time of people and goods, in a structure like compartment or frame. This movement, at a time in history was possible through the road mode; then the waterways. It later extended to the railways, then the air and much later, the pipelines. With advances in the application of systems and codes, we began to witness huge data flows and transfers, including the much applauded electronic transactions’ system platform, on which we aid our businesses. In view of the phenomenal developments around these systems and codes, information and communication systems evolved, resulting in telecommunications network, for the transfer and management of data files. An attempt is made to match the features of this system with the fixed facilities for defining transportation systems and their individual characteristics.*

1. Introduction

Historically, transportation has been associated with the movement of people, animals, items, goods etc from one location to another, with the aid of a flow entity or unit.’ [1] In contemporary terms, and with the increasing differentiation in the ways and methods of defining flow entities, or units, considerations are now being given to activities that use fixed facilities, flow entities and control systems to facilitate the movement of people and goods to overcome the friction of geographical space’ [2] and then, achieve a timely engagement, of the subject matter, in another activity, at its immediate destination.

In transportation, the application of the General Systems Concept is evident, due to the existence of sub-systems [3]. In this regard, a transportation system with identifiable fixed facilities, should consists of the physical components of the system, fixed in space, and incorporating its network of linkages, as with road way segments and nodes; railway track and terminal beds; pipes and tank farms; harbours and quays and airport and runways. In the telecommunications network, we have as fixed facilities, satellite systems, microwave systems, coaxial cables, twisted pair-cables, GSM physical and logical channels [4], infra-red rays, radio frequencies, android devices etc.

1. The Flow Entities and the Control Systems

As earlier stated, a transportation system includes the aspect of flow entities that transverse the fixed facilities as in vehicles, containers, railway carriage and wagons, aircrafts, pipes etc. In a similar way, we have audio, textual, graphical, pictorial, video files and folders that can be moved as e-mails, Pdf files, telemetry etc [5]. The Control System as an aspect of a transportation system consists of the vehicular control and flow control. This involves the technological way in which the individual flow entities are guided on the fixed facilities, like the protocols for their integration. Protocols help to eliminate conflicts between flow entities by introducing an order or rule of engagement. In order to maintain order, they can either truncate the data through data mix-match or drops data due to saturation of the designed carrying capacity, based on its memory space.

1. Transportation System

In view of the background above, transportation systems can then be classified into six broad systems according to the medium on which the flow elements are supported. Their flow elements and their supporting facilities are:

1. Road transportation system and as separated into;
2. Trunk roads
3. Highways
4. Rural
5. Railway transportation system and as delineated by
6. Monorail track network
7. Trams
8. Narrow gauge
9. Standard gauge
10. Broad gauge
11. Air transportation system and as classified into
12. Domestic
13. International
14. Space technology
15. Water ways/Maritime transportation system and as given under;
16. Inland waterways
17. Coastal water navigations
18. Ocean liner routes
19. Pipeline transportation system and as grouped under:
20. Refined oil pipeline
21. Natural gas pipeline
22. Crude oil pipeline
23. Water services
24. Others
25. Telecommunications network transportation system and as represented by
26. Voice files
27. Data files
28. Graphical files
29. Picture files
30. Video files
31. Electronic Data Interchange files
32. Telecommuting
33. Telemetry
34. Telecommunications Network

C. S Papacostas and P. D. Prevedourous [6], have established that a transportation system can be defined on the basis of its given fixed facilities, flow entities and the associated control systems. Along this path, therefore, communications network satisfies the broad description of a transportation system and even exceeds it, as it is complete on its own network and may not need inter-modality linkages. There might be arguments, on the absence of inter modal connections in the description of a transportation system. However, within the network of telecommunications, there exist, interconnectivity within the various flow entities on the network, as with the GSM facilities interconnecting with the internet systems; android facilities, interconnecting with e-mail platforms and Pdf file formats, etc. It could also be argued that the absence of a direct inter modal connection between communications networks and other modes, does not eliminate the fact that telecommunications network possesses the complete features of a transportation system.

In yet another perspective, it can be said that an aspect of inter modal connection between telecommunications network, as a transportation system, with the other modes is evident in the use of Intelligent Transportation System facilities (ITS), that exclusively belong to the telecommunications network [7]. Additionally, inter-modality with telecommunications network abound, but not in the same structure of flow entities. The linkage is established as you download files, print them and physically transport the printed documents in hard copies, using any of the other modes, or systems. In this sense, the change in the structure of the data, from its soft copy to hard copy, would distort the language, form, character, structure and definition of the flow entities for telecommunications network, but would conform to the structure for movement within any of the other modes. This change in structure is only needed to suit the requirements for another mode of transportation in the context of inter-modality.

1. Characteristics of transportation Systems

In view of the outlined features of telecommunications network, a comparison of its features with those of other transportation systems reveals these similarities:

1. Queuing Process

In all transportation modes, queue occurs. Arrival time and departure time of planes are aligned and programmed to avoid conflict, based on time. In a similar nature, our transactions on the telecommunications network is timed and treated along that path, which allows subsequent messages to queue.

1. Priority of Routes or services

In the railway mode, there is priority of services where an Express Train takes precedence over a Local or Inter-city Train, based on the level of priority of service accorded to each of them [8]. In a similar fashion, voice channel has priority over data. However, where network synchronization problems exist, your voice messages may not get through, while your data file may be accepted. This alone does not provide for the superiority of data over audio or audio files.

1. Attenuation, Noise

Noise is a particular feature in transportation and can be explained in various forms. In the air mode, a sudden encounter with thick clouds or hurricane, introduces noise. An uneven road surface introduces noise in road transportation; Waves, hurricane, violent wind etc introduce noise in the movement of vessels in the high seas. As with telecommunications network, joints in the communication cables, jamming of calls, full engagement of the design capacity of the band width of telecommunication cables in use, wind and whether that can impede the line of sight of microwave masts, constitute attenuation in the network.

1. Take off platform, Station, Park, Berth, Runway

Each of the established transportation modes has a takeoff platform or lunch station. In telecommunications network, its take off base includes the various personal computers, servers, android and electromagnetic devices, like GSMs, ATMs and other EDIs.

1. The Route path or Vessel used as the Flow Entities.

The vessel constituting the flow entity for any given transportation mode is always evident in the given mode. We know of cars, trucks, carts, aero planes, ships, boats, carriages and wagons and pipelines for the various distinct modes. In a similar fashion, we should recognize the ATM, GSM, computers and android devices, POS machines, List and Moose signaling keys, EDIs, remote control sensors etc as flow entities in the telecommunications network.

1. The Fixed Facilities associated with the Transportation Modes

As the physical components of the individual transportation systems that are fixed in space and constituting its individual network of links, we have in the communications network, Coaxial Cables, Videotext, Optic Fiber Cables, Pair Cables, Facsimile, Microwave System, Wi-Fi system, Satellite Systems etc.

1. Sender – Item – Receiver

With the exception of situations where Human beings constitute the object of the movement, we usually have and demand for the following fields:

1. Sender – Consignor
2. Description of the item being consigned
3. Receiver – Consignee
4. Originating time and location
5. Destination location

In the case of the telecommunications network, some of these fields may not be revealed to the user, but it is in the memory of the platform used. Additionally, there could be multiple destinations for the transported item, of which delays in delivery do not occur.

1. The Concept of Reverse Logistics

In our conventional transportation modes, we often undertake reverse logistics. A feature of this occurs as Returned Container Traffic or the returning of Super Tanker vessels to their loading bays for re-loading. We can also record similar phenomena with telecommunications network. If there are costs arising there from, they are equally evident in telecommunications network. We can account for non-delivered e-mails that are returned to our boxes; drop calls on our GSM platform;, SMS (text messages) that are returned unsent etc. One of the costs associated with such reverse communication or logistics is the increasing occupation of our memory space that can truncate our files or bar the reception of further files into the memory, if in occupation and at the optimum level.

1. Storage or Warehousing Facilities

There is usually a holding area in any form or mode of transportation. In a similar fashion, the memory disc or space in the fixed facilities constitute storage or warehousing space. In some situations, just as we have extended or external warehousing, we can now talk of the Internet Cloud, as an external holding area for our data files. Flash drives, memory stick etc abound.

1. Designed Carrying Capacity of the Flow Entities.

Ocean vessels, as in the maritime sector; Carriage and Wagon, as in the railways; road trucks and vans, as in the road; have the designed weight carrying capacities of their individual flow entities. In the environment of the telecommunications network, its flow entities have the same type, directory, size and format of data, it can accommodate. Even with uploading files in the internet, there is an allowable file size, depending on the service provider and the protocol in use.

1. Parking List, Classification and Labeling.

In transportation, we use labels and packing list, Bar codes etc to trace, record, access or retrieve information on the coded items. As obtained in the telecommunications mode, we use file names, folders, and addresses or directory, including correct file formats, to receive to trace, locate and modify files. Access can be barred if it is restricted or locked, as in other modes of transportation.

1. Costs of Service

Various service levels in any transportation system go with associated costs, based on the transit time it offers. In the telecommunications network, such costs are evident. Usually and depending on the band width you choose for the terrestrial level of your radio frequency, you may have good and uninterrupted service based on the costs for those fixed facilities. The size of data bundle you subscribe to is reflected in the speed you enjoy. Therefore, for those on higher frequency, the level of their ‘information float and telephone lag’ are highly reduced. This advantage or benefit reflects in the costs of those services.

1. Conclusions

Telecommunications network has, in the light of the advances in Information and Communication Technologies, distinguished itself, as a complete and formidable transportation system. Despite having the basic characteristics of transportation system, it is complete on its own mode, without the need for much of inter-modality that might confuse our understanding of transportation. Except where the structure or properties of the data, information or communication transported changes, transportation of data files within the fixed facilities of telecommunications network does not require inter-modality. However, we might mention auxiliary or quasi inter-modality, when we consider Intelligent Transportation Systems, where some aspects of the telecommunications network, with the aid of its fixed facilities, is facilitating and controlling operations in other modes.

It is in those given respects that we should accord telecommunications system, a veritable mode of transportation. The speed of transportation in e-commerce, ATM machines, POS machines, the various other EDI platforms, is based on the improvements in telecommunications. What they transfer that results in an activity constitutes their own flow entities and should therefore be accorded the much desired recognition and acceptance as a new form of transportation mode, in our concept of transportation systems.

References

1. C. S. Papacostas & P. D. Prevedouros, ‘Transportation Engineering and Planning’, Third Edition. Pearson Education Inc. page 1.
2. Ibid, page 2.
3. T. Lucey, ‘Management Information System, Fifth Edition, ELBS 1987, page 42
4. <http://www.radio-electronics.com>
5. James A. O’Brien, ‘Management Information System, Third Edition, Mc Graw-Hill Compaies, 1996. Page 193.
6. C. S. Papacostas & P. D. Prevedouros, Loc opt, page 4.
7. Macmillam Encyclopedia of Transport, Vol. 2. Macmillan Reference, USA. The Gale Group, page 55.