

**Relation between  
Corporate Planning,  
Implementation,  
Fundamental Technical Plans,  
Project Management and  
Particular Technical Plans**

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## **Relation between Corporate Planning, Implementation, Fundamental Technical Plans, Project Management and Particular Technical Plans**

### **1. General**

All Telecommunication Administrations have planning activities, corporate planning or group planning. In ITU-T, the word “Long Term Plan” is used in the same context. The long-term plans are regarded as strategic plans and cover a wide range of aspects, e.g. demand from the market, changes in the market, technical development, economy, etc. These plans are called Fundamental Technical Plans. The “Short Term Plans” are project and system dependent.

### **2. Implementation Plan - Development Plan**

In a general model for digitalisation process, it is described how an implementation/digitalisation could be carried out in a most proper/profitable way. The development of a telecommunications network at each occasion is defined in an Implementation Plan through guidance from corporate planning/fundamental plans. In almost all known cases, there is a national telecommunications network already build up. This telecommunications network shall be extended and transformed towards what can today be regarded as a “target network”. During the different phases to reach the “target network”, exchanges and network of different kinds must be progressively installed and extended.

All these implementation phases are the activities that involve functional or geographical units of the organisation at different levels. In some cases, the implementation of new exchanges or parts of the network are carried through by a national-wide organisation. In other cases, a number of organisational units are involved whereby such implementation activities will be part of the budget and planning process for each of these organisational units. A project implementation plan will be further discussed in subject “Project Management”.

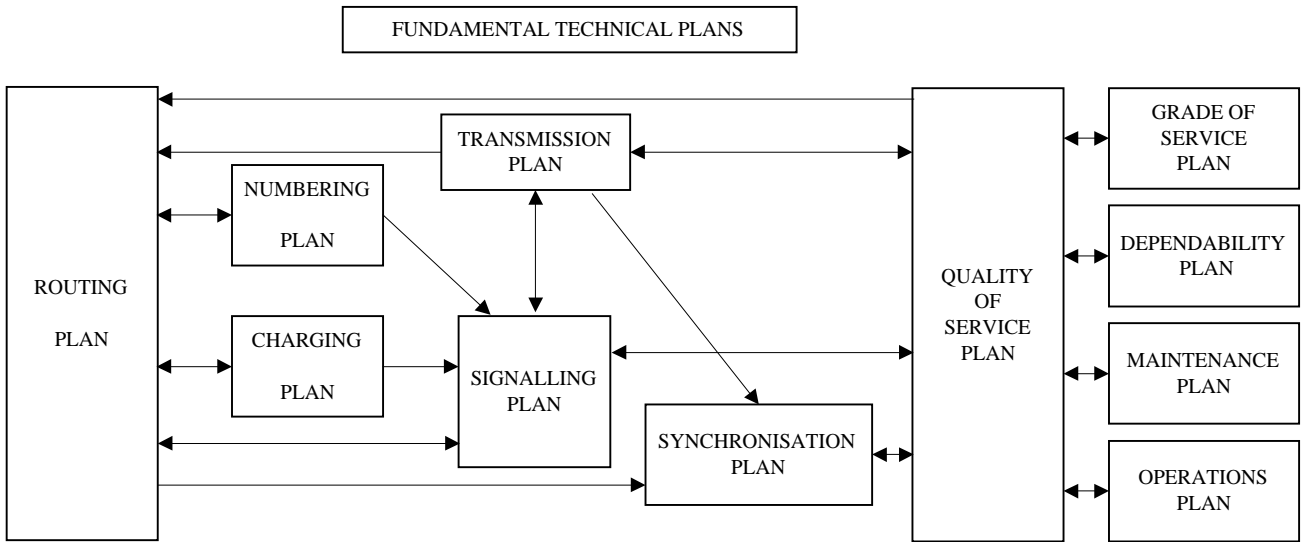
### **3. Fundamental Technical Plans**

#### The objectives

The objectives of fundamental technical plans are to give a set of rules and standards for the design, build-up and usage of the telecommunications network. Each plan will have more detailed objectives and describe or recommend in depth characteristics of, for example, transmission, routing, charging, but also give standards or targets for service. The fundamental technical plans are more general. In the particular case of extending a network, particular technical plans must be worked out (see next chapter).

#### Interrelation between plans

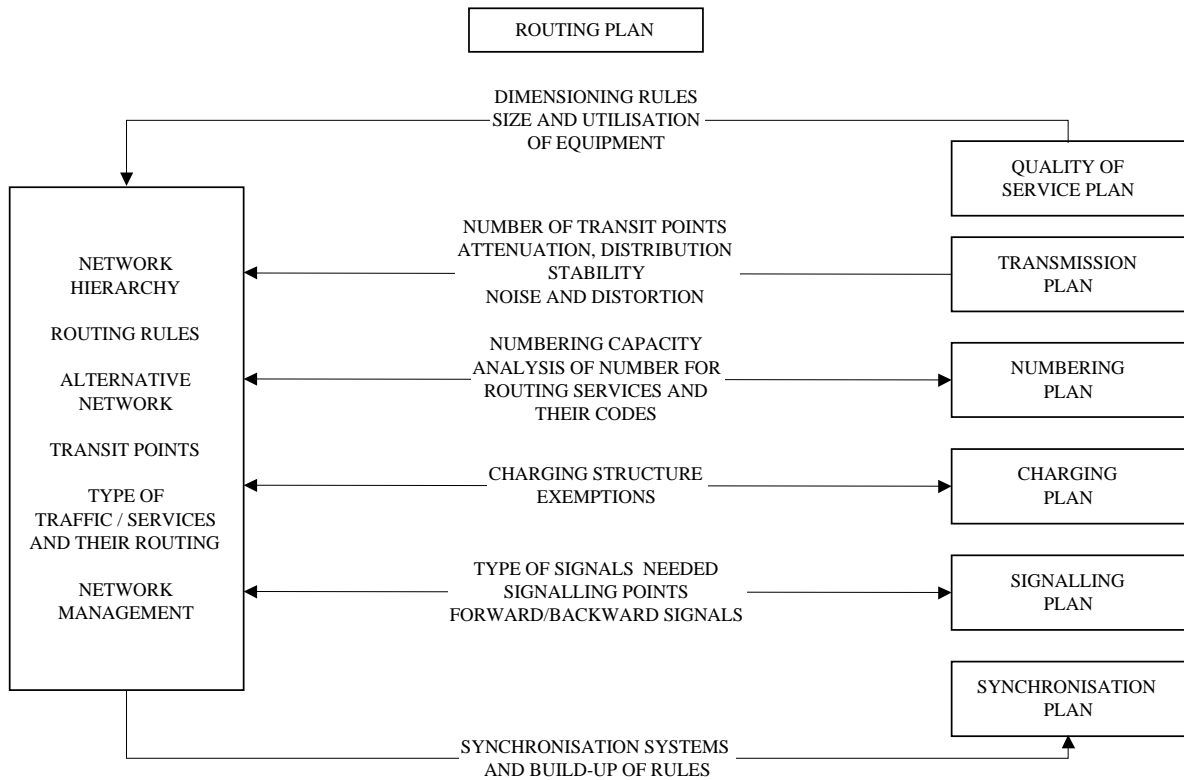
Figure 1 shows the fundamental technical plans and arrows indicating the interrelation between them. There are at present, however, some differences in naming the different concepts in certain plans. The definition follows as closely as possible ITU-T or CEPT recommendations. As can be seen in Fig. 1, the quality of service plan, grade of service plan, dependability plan and maintenance and operations plan are grouped together. To a certain extent, the quality of service plan will set conditions for the mentioned plans.



**Figure 1 : Fundamental Technical Plans**

Routing plan

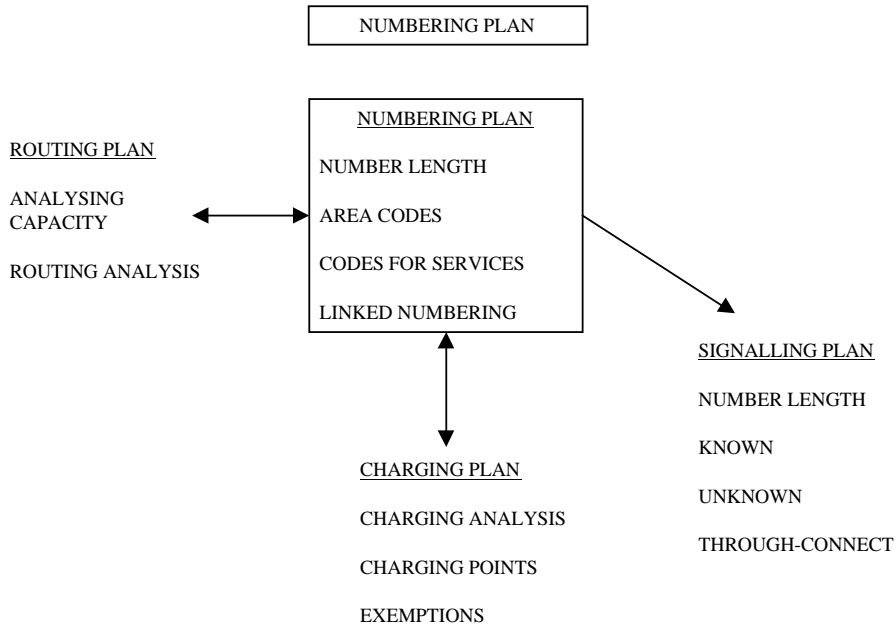
In Figure 2, it is given a rough layout of the routing plan and its influence to and from other plans. The routing plan will describe network hierarchy, routing rules, alternative routing, transit points and routing of different types of manual traffic or services.



**Figure 2 : Routing Plan**

Numbering plan

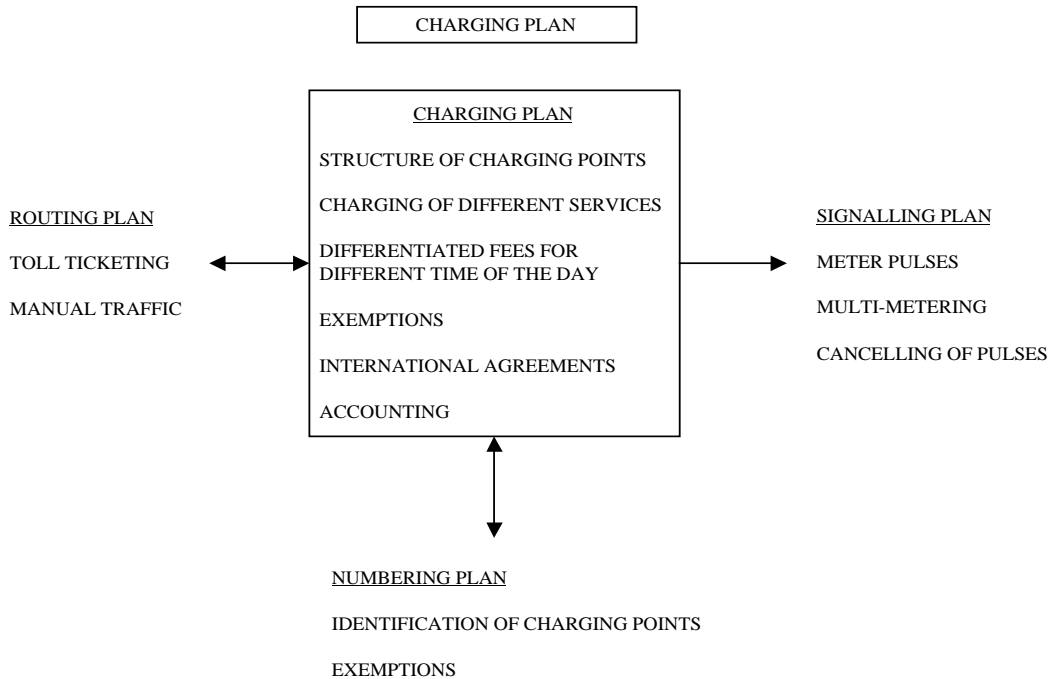
When establishing a numbering plan, the total future need of the administration must be envisaged as to number of subscriber lines, its distribution, what type of services will be needed, etc. Study Figure 3 which will illustrate the relation to other plans. This is an important plan when taking the ISDN concept into consideration.



**Figure 3 : Numbering Plan**

Charging plan

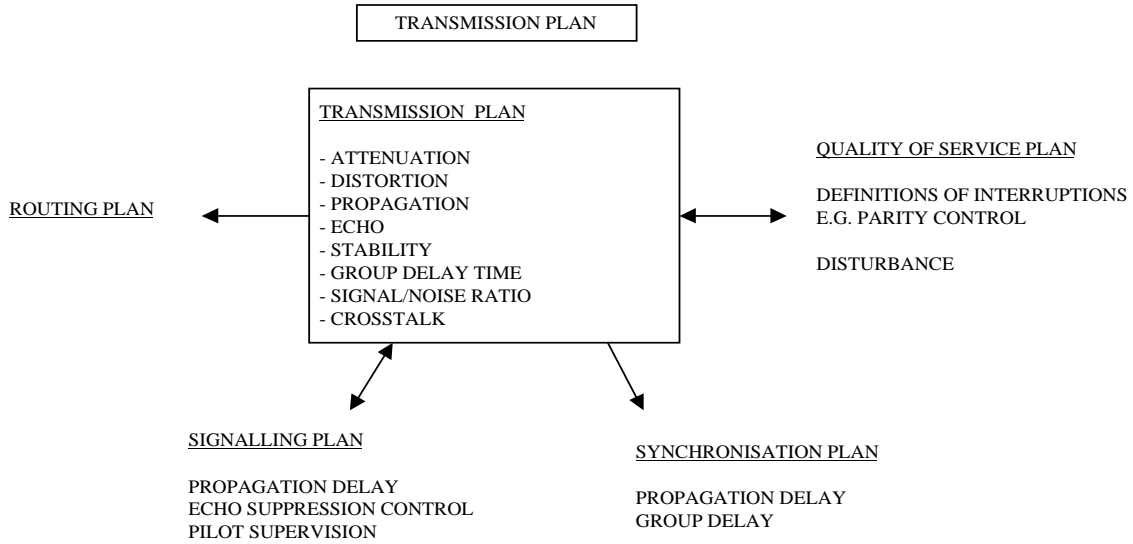
The charging plan will reflect the tariff structure, the fees for long-distance calls, use of toll-ticketing fees for services, unit fees for certain type of calls, etc. The charging plan might also be used as an instrument to control traffic pattern (e.g. higher rates for calls within busy hours). Figure 4 gives an idea of how a charging plan interacts with other plans.



**Figure 4 : Charging Plan**

Transmission plan

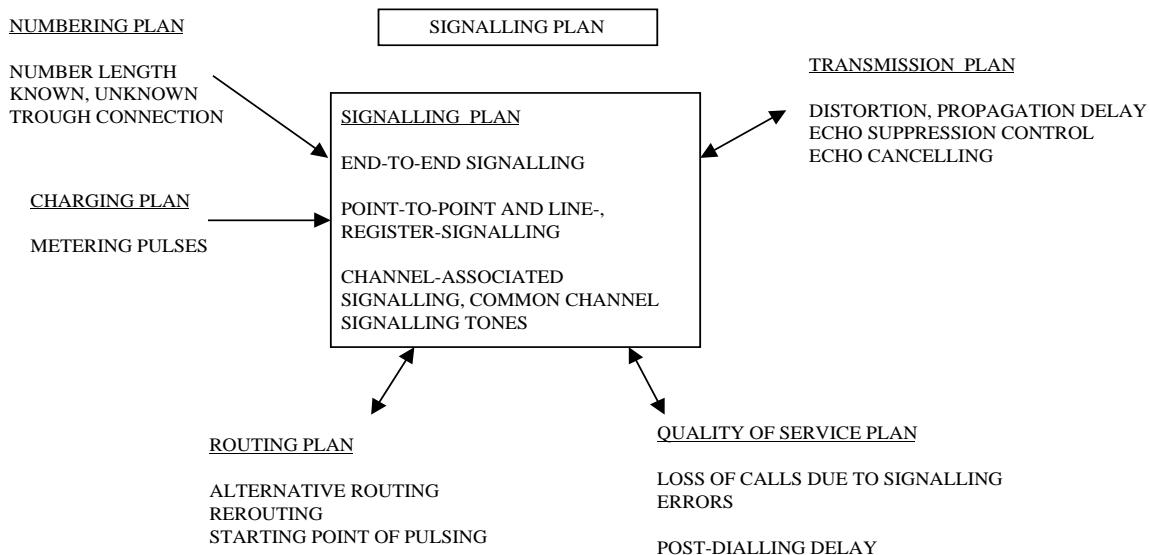
It is important to understand that this plan is not static. There are always changes, but some facts may stay stable, such as total attenuation permissible. The transmission plan (Fig. 5) has a number of characteristics such as attenuation, distortion, signal/noise ratio, propagation time, group delay time, etc. The new digital techniques will, for example, involve introduction of four-wire switching in places where the switching has previously been based on a two-wire system in the analogue network. The previous arrangement regarding amplification and stability will have less influence on planning the network. This exemplifies that emphases in a fundamental plan will change. The function monitoring or setting standards in an administration for fundamental plans will be an important link in telling the suppliers what the administration really needs.



**Figure 5 : Transmission Plan**

Signalling plan

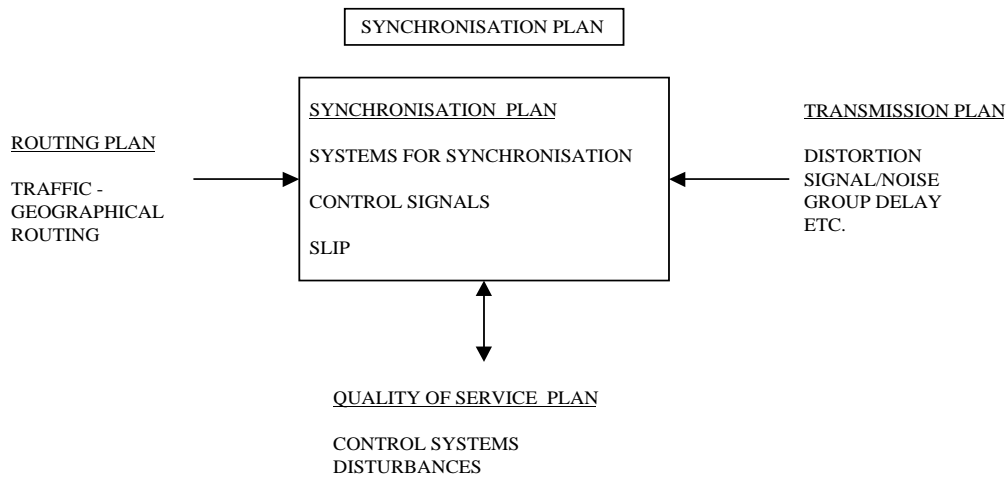
The importance of consistent planning ensuring compatibility between different types of equipment is evident. When studying Fig. 1, you can see that there are many interdependencies from or to the signalling plan. Each administration has to develop its knowledge and experience in this field. Monitoring the performance of the signalling is an important factor when developing maintenance and operation skills in the administration. The recent changes that SPC techniques have introduced when using common channel signalling will have a great impact on the usage of the network. They will give, for example, better economy, fewer circuits needed, shorter post-dialling-time. Even the technical principles of end-to-end signalling will have great economic importance, thanks to fast signalling and hence switching times. Some examples of the contents and features of the signalling plan are given in Figure 6.



**Figure 6 : Signalling Plan**

### Synchronisation plan

The digital technique and time division in combination with high signalling speed enforced the need of synchronisation. The different aspects and features of synchronisation are described in depth in the corresponding chapter. Relations to other plans are given in Figure 7.



**Figure 7 : Synchronization Plan**

### Quality of service

As it can be seen from Fig. 1, the quality of service plan can be regarded as a covering plan giving policies for the availability, grade of service, maintenance and operation plans. But it also gives an administration a structure for setting targets (key-figures). To a certain extent, the quality of service plan can also be regarded as a managerial link between fundamental plans and the budget and planning process.

### Dependability

The complexity of a modern telecommunication network requires a structure that will ensure a balance between performance (availability, reliability, maintainability) of a network, its components and the maintenance support. The administrations have to set standards and targets in order to give the network designers and overall guidelines on how the network should be structured. The traffic potential of a network can be increased by proper use of its spare capacity or in the case of overload or disturbance use of what is available. (The concept of network management will be treated as a separate subject, but in connection with quality of service - availability.)

### Grade of service

The rules for dimensioning a network, i.e. number of circuits, traffic-carrying devices in switching equipment, processor capacity (markers or registers), etc., are laid down in the grade of service plan. It contains rules for dimensioning of subscribers equipment (e.g. PABXs). Answering time on manually operated services is also a part of this plan.

### Maintenance plan

The set of standards to define maintenance organisation and resource will be given in a maintenance plan. This plan will influence the relation between and use of preventive/corrective maintenance and use of different maintenance principles. Regarding SPC technique, this will also give guidelines for development of technical support (maintenance procedures, documentation, spare part, software, handling, etc.), manpower planning and staffing hierarchy.

## Operations plan

One overall objective for fundamental plans is to make sure that the feedback to the planning function is working according to a set of follow-up criteria. In an administration, all operations performed have to be followed up by, for example, traffic recording, statistics, subscriber behaviour, utilisation of services. The extent to which an administration has to use methods and means will be part of the operations plan. The performance observation and planning activities results in the need for new equipment and functions of the network. The operations plan will describe how this will be handled in an organisation.

### 4. **Project management and implementation**

The relation between different documents is shown in Figure 8.

#### 4.1 **Implementation Plan - Project Plan**

In order to manage the implementation of a project including the introduction of new exchanges and extension of exchanges, a time schedule and technical definition of the development of the network at each point in time must be made.

During the different phases of implementation, exchanges and network must be progressively installed and extended. This cannot be done in one exchange without affecting other exchanges in the network.

This involves:

- a) Extension of the local and national junction/trunk network;
- b) extension of the international network;
- c) introduction of new Zone/Group Centres;
- d) introduction of a new ITSC;
- e) introduction of local SPC exchanges, RSU and RSM;
- f) extension of analogue exchanges;
- g) extension of existing special services;
- h) introduction of new subscriber services and test;
- i) introduction of new Signalling Plan, including signalling systems, ITU-T R2 PCM and common channel signalling, ITU-T No. 7 and ITU-T No. 6 (in ITSC);
- j) introduction of a new Routing Plan including new Zone/Group Centres;
- k) introduction of a new Transmission Plan;
- l) extension of existing Numbering Plan;
- m) introduction of a Synchronization Plan;
- n) introduction of a new Charging Plan;
- o) introduction of Centralised Operation and Maintenance;
- p) manager temporary routing with the different phases of installation, e.g. new designed function, IT/OT, not available for the first installation.
- q) traffic load and grade of service within the different phases of installation.

This means that exchanges will be continuously changed. Software data and strapping and gradings of exchanges will need to be designed in a controlled way, implemented according to a certain plan, co-ordinated with material delivery and design.

Each exchange must be altered a lot of times according to well defined steps of implementation to avoid extensive and difficult frequent changes in routing, signalling, etc.

In order to reduce the amount of work, a "package" for routing, etc., has to be defined for each exchange to fit into the long-term planning and final network configuration. Thus, a package will not just cater for the requirements upon the exchange at the point of time for introduction, but will contain data applicable to that exchange as far as possible in the future, e.g. routes will be included in data with all information, but the route will, for the moment, be blocked until a certain exchange will come into service.

The strategy proposal for implementation of digital exchanges is a digitalisation plan. A first digital node is created by introducing one or several digital tandem exchanges with PCM (or analogue) trunks to the corresponding existing exchanges. New digital local exchanges should, if possible, use direct trunk groups (PCM) to the nearest analogue exchanges.



The basic principles which are outlined above should be the guidelines for an “Implementation Plan” of the project.

#### 4.2 Particular Technical Plans

In order to manage the introduction of a big project, it is necessary that the following “Particular Technical Plans” be considered and settled:

- 1) Switching and Routing Plan including digitalisation and Interim Plan.
- 2) Transmission Plan including Level Diagram.
- 3) Signalling Plan including Current - and Interim Plans.
- 4) Numbering Plan including Current - and Interim Plans.
- 5) Synchronisation Plan including Interim Plans.
- 6) Services Plan including Operator services, Subscriber services, Special services, Tones and Announcements.
- 7) Operation and Maintenance Plan.

These plans are to be based on the Implementation Plan for the project which should have been settled at the contract negotiation. A more detailed description follows.

#### GENERAL ABOUT PARTICULAR TECHNICAL PLANS (PTP)

Depending on the actual status and level of competence, the proposed particular technical plans should be worked out in co-operation with selected suppliers for the extension of the network. It is thus important that a project leader for a digitalisation project knows what parts are important and that his administration has the competence and manpower available to complete the documents needed.

##### Routing Plan

In order to make it possible to program (make the data, transcript for) new exchanges, a routing plan must be settled.

This plan should include the routing principles, a detailed network optimisation and the interim routing principles, “package”, for each exchange, according to the “Implementation Plan” as discussed earlier.

An important part of the “Routing Principles” is to define the different “Routing Programs”, number off digits received, call forward, time for seizure of outgoing trunks and number of digits to be sent for the different traffic cases.

##### Transmission Plan

The present transmission plan for the market must be updated in order to include the introduction of digital switching, etc. The plan is needed in order to make it possible, to make up the “Transmission Level Diagram” for the different new exchanges. The level diagram is the input information for strapping of pads, etc.

The transmission level diagrams for the different exchanges are to be made up by the responsible functional unit or in co-operation with the supplier.

##### Signalling Plan

The signalling plan is one of the most important particular technical plans.

The plan is made up in order to define the different signalling systems used. In the plan, the following subjects are discussed and defined:

1. General Principles
2. Subscriber Line Signalling
  - Telephone sets
  - Make-to--break ratio
  - Maximum loop resistance
  - Current feed
  - Line insulation resistance
  - Push-button signal receiver

- Subs and PABX's signalling diagram
  - PABX with DID signalling diagram
  - Time supervision of subs dialling
3. Junction/Trunk Line Signalling
    - Different signalling types and diagram
    - Future signalling systems
    - Signalling cases
    - Time supervision
    - CCS principles
  4. Register Signalling Diagram including the meaning of the different signals and MFC register Signalling Sequence Diagrams for all different cases.
  5. Requirements on junction/trunk line circuits - PCM/transmission, synchronisation, converters.
  6. The signalling network configuration and principles for a common channel signalling system.

The document will settle a lot of permanent, as well as variable, exchange data.

#### Numbering Plan

The administration is responsible for the numbering plan. The plan is made up in order to define the current numbering plan and how to prepare the plan for the project, and how to prepare for the future plan defined in the FTP.

In the plan, the following subjects are settled:

- International prefix
- Trunk prefix
- Trunk codes
- Digit length
- Special service numbers
- Subscriber service numbers

The plan will settle a lot of permanent and variable exchange data.

#### Charging Plan

The administration is responsible for the charging plan.

A new charging plan has to be implemented. This plan has to include information on how the different subscriber service should be changed, e.g. provision of a service which may imply administrative fixed fees - booking, registration, erasure and/or cancellation being changed with a number of pulses or free of charge, etc.

The plan will settle a lot of permanent and variable exchange data.

#### Synchronisation Plan

The plan settles the principles for synchronisation of the digital network.

During the first phases, the digital exchanges may be synchronised by the master-slave method. Within a second stage, however, these exchanges are to be synchronised by the mutual single-ended method.

Isolated digital exchanges should be prepared for introduction of network synchronisation functions.

#### Service Plan

Service plan includes the following information:

##### *Operator Services*

The plan defines the principles for routing and inter working the different operator system used in the network. Furthermore, it also specifies the general principles for a new SPC based exchange with Operator Service Systems.

##### *Special Services*

The plan defines the special services with the network, e.g. time-, weather- and TV-programs, etc.

#### Subscriber Services

The plan defines the different services and service code used and includes the following:

1. list of subscriber services and functions
2. used subscriber classes of services including their description
3. description of the different services
4. subscriber procedures and service codes

#### Tones and Announcements

The plan defines if recorded announcements are given, for e.g.:

- congestion in outgoing route,
- interception,
- subscriber services,

and specifies if the tone is to be sent together with the announcement. It also states the number of machines.

The tone information part defines the following:

- the different tones specified
- frequencies
- interruption of tones
- levels

#### Operation and Maintenance Plan

The document is to define the different activities and responsibility during co-operation between different Administration staff, Support staff and/or supplies.

Various functions will have to be defined and introduced:

- operational centres
- administration centres
- support centres

i.e. the document will define, for example:

- if a AOM is included for the project or not,
- the number of documentation sets,
- the principles for training, e.g. training for “data transcript”,
- the principles for support activities,
- the principles for “fault reporting” and repair.

#### 4.3 Application System Information

1. All system bound information has to be described. Such “Application System Information” includes the following information:

Functional Engineering including:

- the list of functions,
- the list of function blocks,
- hardware block diagram,
- the specification of functions
- the list of products including correction notes.

The most important input documents for the documentation work of the “Application System Information” are the “Particular Technical Plans” and the “Functional Specifications” for the source system.

## Functional Engineering

### List of Functions

In order to make it possible to test and verify that each function is according to the customers' specification, the List of Function includes references to documents where the function is specified, i.e. with references to SOF, PTP and Exchange Requirements (ER).

### List of Function Blocks

The functional modularity of the system made it possible to translate each and every functional requirement (see "List of Functions" above) into a specific function block or blocks. Such a block contains hardware, regional and/or central software.

### Hardware Block Diagram

All hardware magazines are to be defined in the hardware block diagram.

### Specification of Functions

All general SPC exchanges (hardware and software) Functional Specifications (FS) are adapted to the requirements of the market. These new documents which are selected as parts of the general functional specifications are defined as Specifications of Functions (SOF). The document specifies most of the Permanent Number Symbols defined for the different functions (products).

### List of Products

All products, hardware and software, are listed in the document. The "Application System Information" also includes information for customers planning of "Correction Notes - Application System" (CNA) and general amendment documentation.

## 4.4 Exchange Requirements

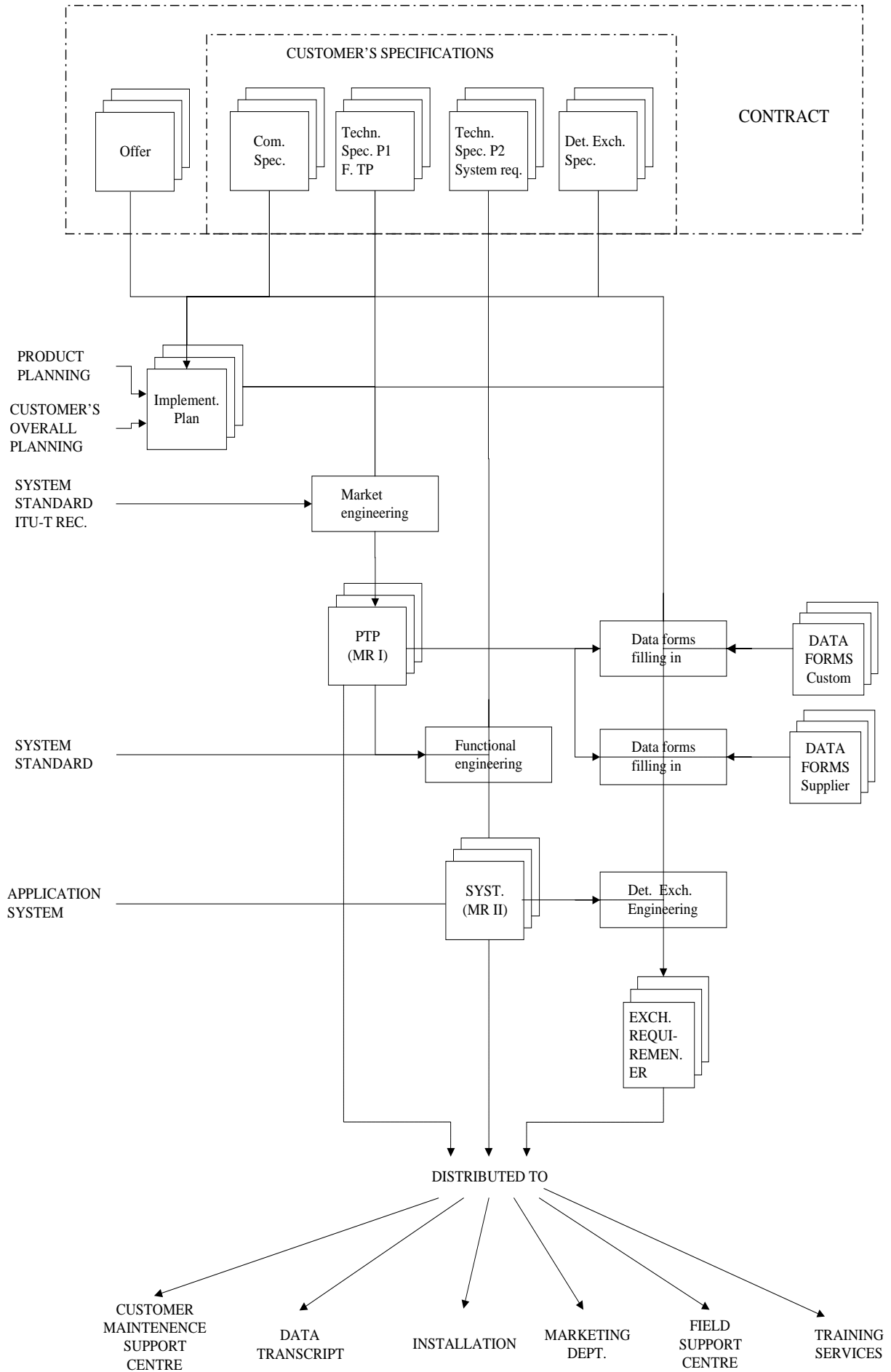
Variable exchange data per exchange are included in the file Exchange Requirements (ER).

To simplify the handling, all system command forms are replaced by form designed in such a way that the user does not need to know anything about the syntax of the exchange commands. These forms, which are to be found in the file "Data Forms", are filled in and included in the ER.

The routing work, the data transcript, usually is not included in the Implementation Plan.

The document includes the following information:

1. general information about the exchange,
2. all filled-in data forms,
3. allocation of hardware,
4. and the list of products.



**Figure 8: Relation between different documents**

## FUNDAMENTAL TECHNICAL PLANS, GROUP WORK

### Objectives

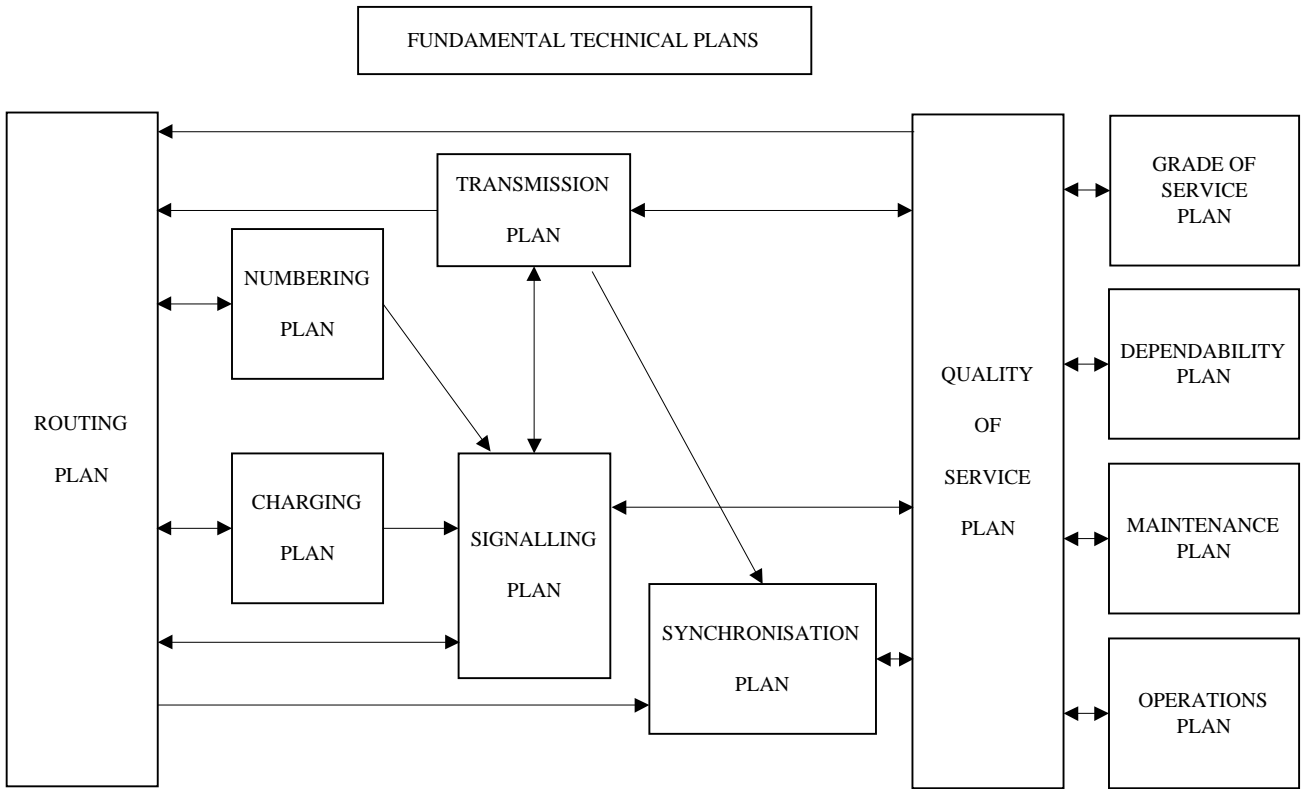
To get an introduction to the contents of fundamental plans.

### Task

Listed below are a number of expressions/criteria which are relevant to one or more fundamental technical plans. In fact, normally, at least two plans are involved. If so, associate each numbered expression/criteria with a line connecting two relevant plans in Figure 9. If only one plan is involved, put the number inside the frame of the plan.

### Expression/criteria

1. Signal/noise ratio (indicated in Figure 1)
2. Subscriber line availability (indicated in Figure 1)
3. Slip
4. High usage routes
5. Congestion traffic intensity
6. Unknown number length (end of number)
7. Number of analogue/digital conversions
8. Post dialling delay, PDD.
9. Alternative routing
10. Mutual single ended concept
11. Premature release ratio
12. Installation delay of a telephone set
13. Wander
14. Congested route and consequent action
15. Mean time between system failures
16. Message transfer part
17. Bandwidth
18. Traffic recording programs
19. Number of 2W/4W conversions
20. Budgetary limitations of targets
21. Master slave concept
22. Mean holding time
23. Propagation time
24. Tariff areas
25. Network management
26. Number of user complaints
27. Number of satellite hops
28. Traffic distribution
29. Answer/seizure ratio (completion ratio)
30. Routing of manual traffic
31. Parity control
32. Repair delay of a fault
33. Number of transit points
34. Echo
35. Mean conversation time
36. Traffic supervision programs
37. Plesiochronous operation
38. Transmission of multi-metering information
39. Range of charging possibilities
40. Number of transit points



**Figure 9 :Work Sheet - Fundamental Technical Plans**