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TELEMATIC SERVICES

TERMINAL EQUIPMENTS AND PROTOCOLS FOR TELEMATIC SERVICES

GENERAL OVERVIEW OF THE T.510-SERIES RECOMMENDATIONS

ITU-T Recommendation T.510

(Previously “CCITT Recommendation”)

FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation T.510 was prepared by the ITU-T Study Group VIII (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

2 In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

CONTENTS

Recommendation T.510

GENERAL OVERVIEW OF THE T.510-SERIES RECOMMENDATIONS

(Helsinki, 1993)

1 Scope

The T.510-Series Recommendations contains the specifications for implementation requirements (IR) in correspondence with the T.500-Series Recommendations.

This Recommendation provides the necessary definitions required for the establishment of Recommendations within the T.510-Series.

This Recommendation gives the guidelines on how to describe the requirements to DAP implementations to be used by an application. Specific requirements of telematic services are not covered by this series of Recommendations.

This Recommendation defines an abstract implementation model in order to structure the IRs and to qualify the function units depending on the classes of requirements.

This Recommendation defines the structure and the notation which have to be used for the description of IRs and how the tables can be used for support statement purposes.

2 Field of application

This Recommendation may be used as an introduction to the Recommendations of the T.510-Series.

This Recommendation describes how the IRs are to be defined in the T.510-Series Recommendations and how they are to be interpreted.

3 References

- Rec. T.400-Series Recommendations *Document Transfer, Access and Manipulation*.
- Rec. T.500-Series Recommendation *Document Application Profiles*.
- Rec. T.560-Series Recommendation *Terminal Characteristics*.

4 Definitions

The terms between double quote marks are defined in this clause.

application: The word “Application” is used as the generic term to represent the set of features, combining communication and document processing, on which end-users may perform operations. The “Applications” may depend on working methods and on allowed processing of documents. Examples of “Applications” are : open interchange of processable documents, cooperative working, etc.

conversion process: The “Conversion” process is used to convert an ODA based format into another format (standardized format or proprietary format), and vice versa. This process should map the “Function Units” composing an ODA document to the corresponding features performed by the other format, if any.

DAP minimum implementation requirements (DMIR): For each DAP, the DMIR identifies the set of requirements that all the “Implementations” should conform to, regardless of the “Applications”. This DMIR corresponds to the common kernel of requirements which will be implemented, and therefore will ensure interworking between “Applications” selecting the same DAP.

externalization/internalization process: The “Externalization” process is used to encode the ODA based file into an ODIF data stream by using the coding rules expressed by ODIF (Recommendation T.415). Conversely, the “Internalization” process is used to decode an ODIF data stream into an ODA based file.

fall-back: A "Fall-back" is a guideline for an alternative processing of a "Function Unit" that may be used by a particular process when the latter is unable to process directly that "Function Unit". "Fall-backs" may only be used when they are allowed by IRs and solely by "Implementations" acting as receivers.

function unit (FU): The "Function Units" are DAP constituent constraints, or combination of constraints, that will be used to specify DAP IRs. "Function Units" sometimes correspond exactly to end-user known document processing features.

generation: An "Implementation" supports the "Generation" of a particular "Function Unit" if it can issue a data steam carrying the corresponding DAP constituent constraints.

imaging: When acting as a receiver, an "Implementation" supports the "lmaging" of a particular "Function Unit" if the received "Function Unit" can be further processed by an imaging process according to the imaging information given by the constituents constraints forming that function unit.

implementation: An "Implementation" is an actual realization (combination of hardware and/or software) that satisfies all or part of the requirements of a particular "Application" in terms of communication as well as in terms of document processing.

implementation support statement (ISS): The ISS is a proforma to be used by vendors to state which IRs are actually supported by their "Implementation".

layout: When acting as a receiver, an "Implementation" supports the "Layout" of a particular "Function Unit" if the received "Function Unit" can be further processed by a layout process according to the layout information given by the constituents constraints forming that Function Unit.

point of control and observation (PCO): A "Point of Control and Observation" is a point available to the user (or the tester) where data can be manipulated and/or observed. This point acts as a point of control when it is used to input some data in the "Implementation" in order to *control* the test procedure. On the contrary, this point acts as a point of observation when, after having performed some *control* on the "Implementation" under test, it is used to *observe* the behaviour of this "Implementation". It is through the PCOs that the user will *see* the "Function Units".

qualifier: A "Qualifier" is a term used to specify the level of requirement attached to a particular "Function Unit" depending on the nature of the process to be performed. For example, the processing of a particular "Function Unit" may be *required* for the generation process while it may be *optional* for another process.

reception: An "Implementation" supports the "Reception" of a particular "Function Unit" when it can interpret the corresponding constituents constraints and perform the appropriate processing.

retention: When acting as a receiver, an "Implementation" supports the "Retention" of a particular "Function Unit" if this received "Function Unit" can be further accessed and processed without loss of semantic information.

terminal characteristics: "Terminal Characteristics" represent the complete technical description of an equipment which has to be developed to satisfy any particular CCITT service defined by Study Group 1. This includes the selection of appropriate "Implementation" specifications depending on the "Applications" allowed by the service. Also, "Terminal Characteristics" may specify additional service dependent characteristics to "Applications" and their corresponding "Implementations".

5 Introduction to the definition of implementation requirements (IRs)

The Document Application Profiles (DAPs) are described in the T.500-Series Recommendations. The prime purpose of a DAP is to define a set of data streams as a subset of all the data streams allowed by the ODA Standard. This is achieved by constraining the constituents and attribute values that may be contained in the data streams that conform to the DAP.

For each DAP, there is need to specify the corresponding IRs. These requirements are concerned with the ability of implementations to generate data streams that conform to a DAP and their ability to correctly interpret the information contained in received data streams so that it can be used by the application or presented to a user.

IRs may be of two types, namely requirements which are application independent and those which are application dependent.

The application independent requirements are defined in the T.510-Series Recommendations in conjunction with the relevant DAPs. As one given DAP may be used by more than one application, the corresponding DAP IRs defined in the T.510-Series Recommendations will be independent of these applications. This ensures that all implementations based on the same DAP will at least satisfy the requirements expressed by the T.510-Series Recommendations whatever the applications are.

The application dependent requirements are to be defined in the T.560-Series Recommendations describing the terminal characteristics.

Implementation independent requirements are specified based on Function Units. A Function Unit is a unit to which a requirement to implementations is specified. A Function Unit is a constraint on data streams, expressed by DAP constituent constraints, their combination or condition on attribute values, etc.

Requirements classification is specified in clause 6. IRs qualify every Function Unit as "required" or "optional" to be supported, and also provide fall-back methods when necessary.

6 Requirements classification

6.1 Classification

As stated before, a precise specification of implementation should guarantee the ability of an implementation to generate data streams that conform to a DAP and their ability to correctly interpret the information contained in received data streams so that it can be used by the application or presented to a user.

Consequently, the following requirements will be addressed:

- requirements on the **generation** of documents by the implementation;
- requirements on the **reception** of documents by the implementation.

6.2 Requirements on generation

An implementation may claim to support the generation of a particular FU if it can issue a corresponding constrained ODIF data stream.

6.3 Requirements on reception

Three different classes of requirements are specified when receiving an ODIF data stream depending on the nature of the manipulation performed by the receiver on the received document:

- *Retention requirements*

  An implementation may claim to support the retention of a particular FU if the semantics of that FU can be retained by the implementation and can be further accessed and processed locally. That information either can be modified by the end-user (for instance, the line spacing in a character content portion), or remains available after more general editing of the received document (for instance, automatic numbering of the footnotes).

- *Layout requirements*

  An implementation may claim to support the layout of a particular FU if it can layout the document in accordance with the layout information when specified within the received document for that FU.

  Note 1 – If the received document does not contain any layout related information, the implementation may be able to present the document to the user by performing a local layout process. The actual layout of the document is then a local matter and is not specified by this Recommendation.

– *Imaging requirements*

An implementation may claim to support the imaging of a particular FU if it can present the document in a human readable form in accordance with the imaging information specified within the received document for that FU.

Note 2 – If the received document does not contain any imaging related information, the implementation may be able to present the document to the user by performing a local imaging process. The actual image of the document is then a local matter and is not specified by this Recommendation.

6.4 DAP Minimum Implementation Requirements (DMIR)

In order to aid interworking between implementations based on the same DAP but providing different applications, every DAP has a DAP Minimum Implementation Requirement (DMIR). Any implementation supporting a DAP must conform to the corresponding DMIR. The DMIRs are defined implicitly for every DAP in the T.510-Series Recommendations (see Figure 4).

7 Implementation model and actual implementation

7.1 Implementation model

According to the previous clause, an implementation may be viewed as a box containing two modules: generation and reception. The second is itself composed of three sub-modules: retention, layout and imaging.

A partial implementation may be composed of one or more of these modules or sub-modules. A complete implementation, that is an implementation composed of all the modules and sub-modules, should, at least, satisfy the DMIR of a given DAP, and can make use of an appropriate set of partial implementations.

7.2 Points of control and observation (PCO)

In order to specify only requirements that can be observed, and consequently for testing purposes as well**,** it is necessary to define the possible points of control and observation (PCO). As illustrated in Figure 1, the points of control and observation are:

– The data stream: input of the reception module and output of the generation module.

– The input and/or output device.

Therefore, an implementation may be able to demonstrate:

– The claimed generation support for a particular Function Unit if it can generate the corresponding constrained ODIF data stream. The point of observation will be the data stream.

– The claimed retention support for a particular Function Unit if it can provide a presentation of the document which exhibits that Function Unit. The point of observation will be the output of the I/O device.

– The claimed layout support for a particular Function Unit if it can provide a presentation of the document which exhibits the layout of that Function Unit. The point of observation will be the output of the I/O device.

– The claimed imaging support for a particular Function Unit if it can provide soft or hard copy of the document which exhibits the imaging of that Function Unit. The point of observation will be the output of the I/O device. See Table 1.

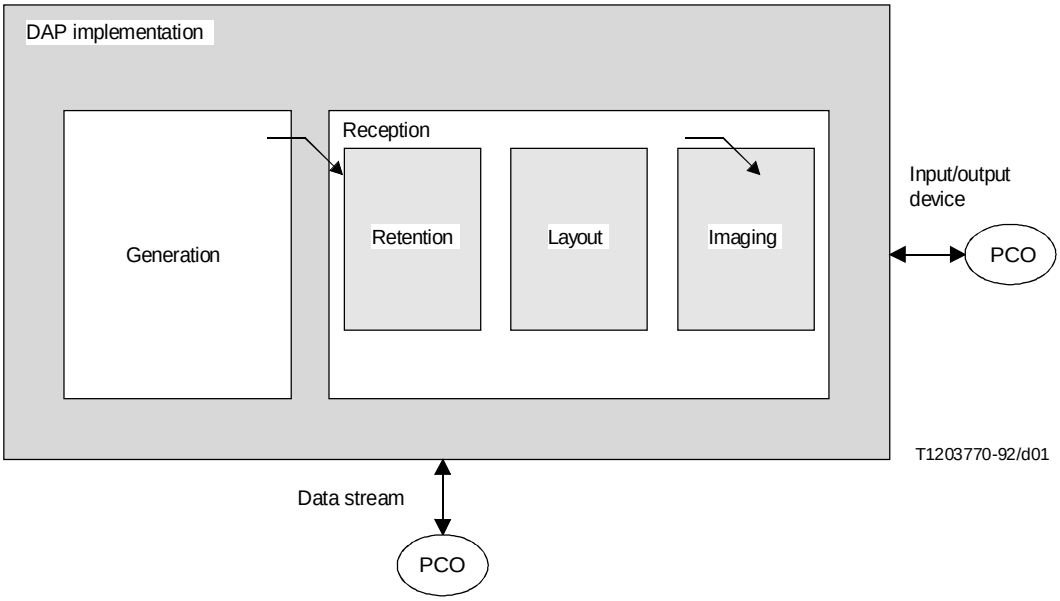


FIGURE 1/T.510

Implementation model

TABLE 1/T.510

Location of the PCOs

		PCO	
		Point of control	Point of observation
Generation		I/O device	Data stream
Reception	Retention	Data stream	I/O device
	Layout	Data stream	I/O device
	Imaging	Data stream	I/O device
NOTE – Table 1 does not specify the test methods to be used. These test methods should be described in conjunction with the definition of test cases and could imply other actual PCOs than those indicated in the table.			

7.3 Actual implementations

This subclause shows possible actual implementations with the processes involved and the relationships between the abstract model defined above and these real processes.

As illustrated in Figure 2, two main types of implementations may be envisaged.

7.3.1 ODA based implementation

This type of implementation performs the editing, layout and imaging of the document directly from an ODA file which either reflects the received ODIF data stream, or has been totally produced. This type of implementation may be composed of an externalization/internalization process which translates the ASN.1 encoding in an ODA file (e.g. using C primitives, etc.) and editing, layout and imaging processes as defined in the ODA Standard itself.

7.3.2 Non-ODA based implementation

This type of implementation performs the editing, layout and imaging of a received document after conversion between the ODA format and an internal proprietary format. This type of implementation may be composed of an externalization/internalization process along with a conversion process which converts the Function Unit into the implementation internal format. The editing, layout and imaging processes are local processes which may not be conforming to the corresponding processes defined by the ODA Standard.

Combinations of these two types of implementations are allowed. For instance, an implementation may use conversion for retention requirements and consequently will use a local editing process to update the document while the layout and imaging requirements are satisfied by the use of direct ODA layout and imaging processes.

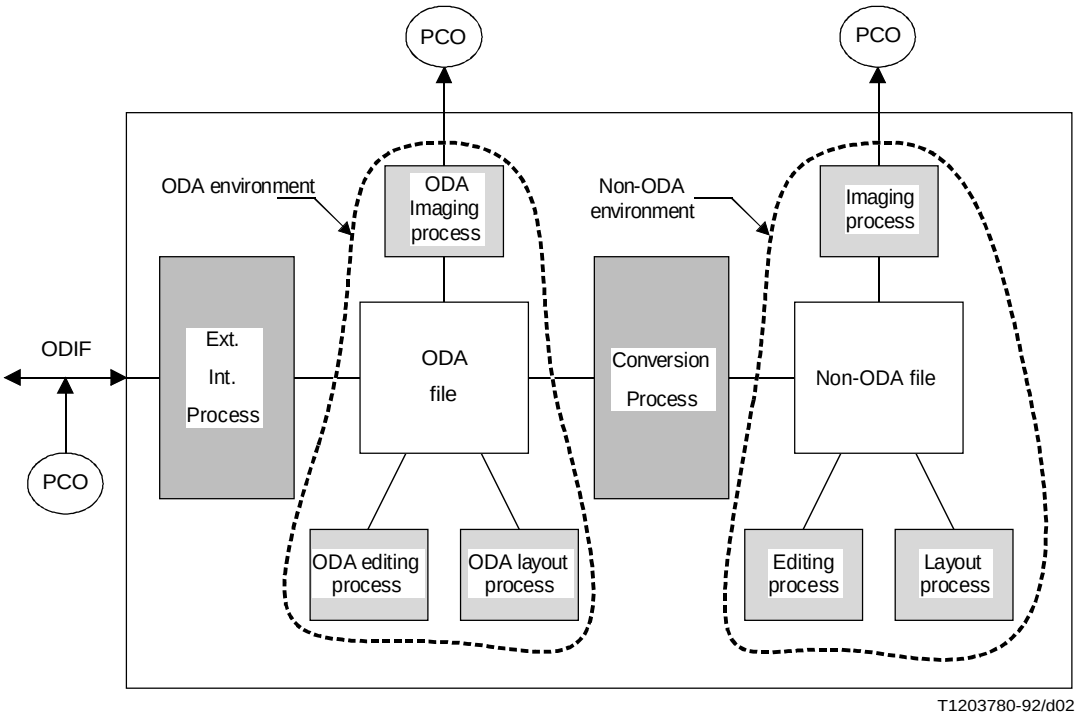


FIGURE 2/T.510

Possible actual implementation

IRs are not specified for real processes, but for the abstract modules defined in the implementation model. However, the specified requirements will have some impact on actual processes of an implementation which will be used for performing the abstract module.

For instance, for a non-ODA implementation, three processes (internalization/externalization, conversion and editing processes) will be necessary for performing the abstract "generation" module. Therefore, the requirements which are defined for this module should apply to these relevant real processes.

8 Specification of implementation requirements

8.1 Introduction

In order to specify IRs, the structure shown in Figure 3 is used, where an FU points to one or several IR classes. Within each IR class, one or several qualifiers apply to the FUs and finally each qualifier may be combined with fall-backs.

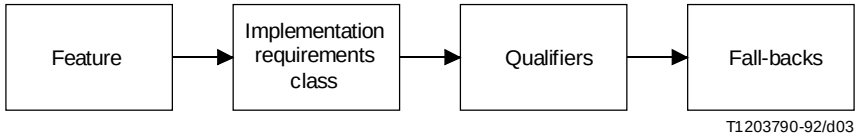


FIGURE 3/T.510

Structure of IRs

The two main classes that are defined in clause 6 are the *generation* and *reception* classes. Requirements on these classes are described in 8.3 and 8.4, respectively.

8.2 Description of Function Units

The "Function Units" are DAP constituent constraints, or combination of constraints, that will be used to specify DAP IRs. As stated in clause 4, "Function Units" sometimes correspond exactly to end-user known document processing features.

Therefore, these FUs will correspond to a combination of attributes to which some conditions apply as illustrated by Figure 5.

Three levels of FUs have been defined:

- the 1st level corresponds to FUs which are performed by a single attribute;
- the 2nd level corresponds to FUs which are performed by a simple combination of constituents and attributes;
- the 3rd level corresponds to FUs which are performed by more complex combination of constituents and attributes.

Each Recommendation of the T.510-Series may specify IRs for the whole set of FUs or may limit the IRs to a limited set of FUs, for example to the 1st and 2nd levels only.

8.3 Requirements for generation

For that class of requirements, each FU will be qualified by using one of the following:

- *Mandatory (M)* – This indicates that the implementation must generate the FU in every document.
- *Required (R)* – This indicates that the implementation must have the capability of generating the FU.
- *Optional (O)* – This indicates that the FU is optional and the implementation may or may not have the capability of including this FU in a document.
- *Prohibited (P)* – The implementation shall not offer the capability of supporting the FU. This FU must not appear in the generated data stream. The use of this P-qualifier may depend on conditions.

The DMIR includes all FUs which are classified either as mandatory or as required.

8.4 Requirements for reception

For that class of requirements, each FU will be qualified by using one of the following:

– *Required (R)* – This indicates that the implementation must be capable of processing the FU when that FU is present in the received data stream.

– *Optional (O)* – This indicates that the FU is optional and the implementation may or may not have the capability of processing this FU when it is present in the received data stream.

– *Not Applicable (N/A)* – This indicates that the FU has no impact on the receiving side.

Additionally, the R and O qualifiers may each be combined with the following:

– *Fall-back (F)* – This indicates that the implementation may provide a specified fall-back mechanism to process the FU when it is present in the received data stream.

The DMIR includes all FUs which are classified as required.

8.5 Summary

Depending on the requirements classes, Figure 4 illustrates the possible qualifiers (or combination of qualifiers) that could apply to the FUs. Thus, four qualifiers may occur for the generation support (M, R, O and P) and four qualifiers may occur for the reception support (R, RF, O and OF).

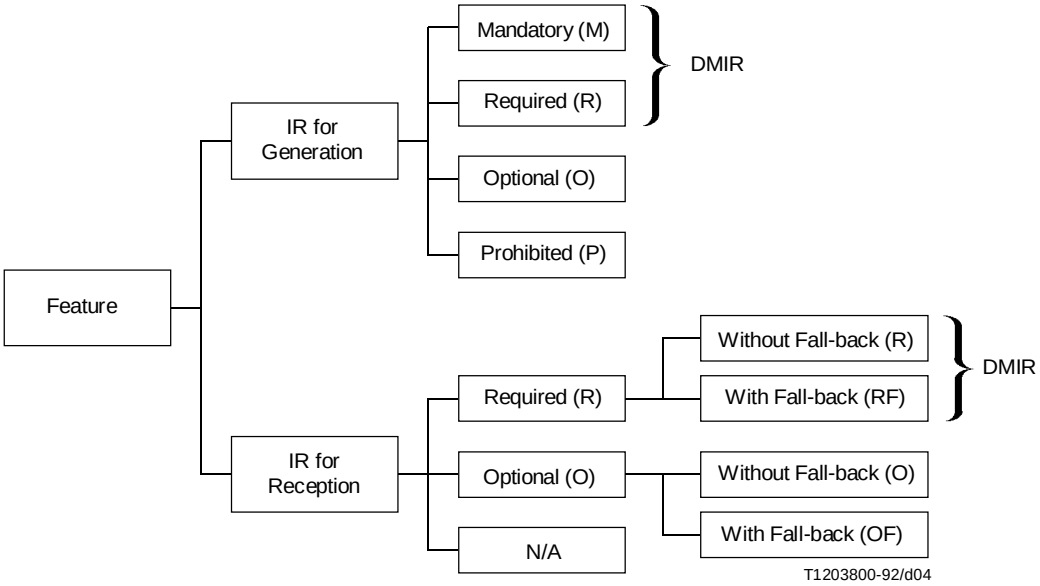


FIGURE 4/T.510

Qualifiers applying to FUs

8.6 Tables proforma

Tables describing IRs should include the list of relevant FUs and should qualify each FU relative to the requirement class to be used. An example of proforma is shown in Figure 5.

			Generation	Reception			
Function units			G	R	L	I	Notes
	Attribute	Condition					
100			XXX	XXX	XXX	XXX	....
....			....	.....	.....	.....	....
1nn							

FIGURE 5/T.510

Tables proforma

9 Implementation support statement (ISS)

9.1 Introduction

The tables of the relevant Recommendations of the T.510-Series containing the IRs may be used for support statements, or as a basis for the developments of these support statements.

The set of minimum implementation requirements must be supported by the implementation while the implemented options are to be indicated in the ISS.

9.2 Description of implementation

The supplier, i.e. the entity who wants to state the conformity of its developed implementation, must describe the implementation. This description should include the total system configuration, the portion of the implementation in such configuration and scope of the support of the implementation.

9.3 ISS

The supplier states whether the implementation (called the *stated implementation* in this subclause) which is defined in the "Description of Implementation" can execute the processes (called the *stated processes* in this subclause) which are also defined in the "Description of Implementation".

The ISS shall be provided by the supplier specifying the following qualifiers for each FU.

1) *In the case of a Generator*

   Y(es) The stated implementation can execute the stated processes for all satisfying data streams.

   P(artial) The stated implementation can execute the stated processes for some satisfying data streams. In this case, the supplier must state the range of data streams that the stated processes can execute.

   N(o) The stated implementation cannot execute, or is not confirmed to execute, the stated processes for satisfying data streams. (It includes the case that the stated implementation can execute the stated processes for some satisfying data streams but the range cannot be described).

   – The stated processes do not relate to this Function Unit.

2) *In the case of a Receiver*

Y(es) The stated implementation can execute the stated processes for all satisfying data streams.

Fall-back is possible if permitted by the Requirement. In this case, the supplier must describe the way of fall-back.

P(artial) The stated implementation can execute the stated processes for some satisfying data streams. In this case, the supplier must state the range of data streams that the stated processes can execute.

Fall-back is possible if permitted. In this case, the supplier must describe the way of fall-back.

N(o) The stated implementation cannot execute, or is not confirmed to execute, the stated processes for satisfying data streams. (It includes the case that the stated implementation can execute the stated processes for some satisfying data streams but the range cannot be described or the performed fall-back is not permitted).

– The stated processes do not relate to this Function Unit.

Range

For a particular process, the supplier describes the range of data streams that the stated implementation can execute when the *Support* is "P".

Fall-back

The supplier describes the way of fall-back that the stated implementation follows, which must be a way permitted by the *Fall-back* description in the IR.

9.4 Relation to the qualifiers

The following relations must be fulfilled when a supplier creates its ISS:

1) *In the case of generation*:

If the qualifier of the FU is M, then the supplier must fill-in "Y".

If the qualifier of the FU is R, then the supplier must fill-in "Y" or "–".

If the qualifier of the FU is O, then the supplier must fill-in "Y" or "P" or "N" or "–".

If the qualifier of the FU is P, then the supplier must fill in "–".

2) *In the case of reception*:

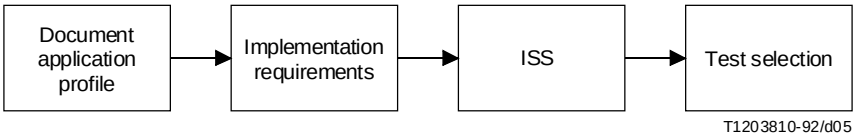
If the qualifier of the FU is R, then the supplier must fill-in "Y" or "–".

If the qualifier of the FU is O, then the supplier must fill-in "Y" or "P" or "N" or "–".

If the qualifier of the FU is N/A, then the supplier must fill-in "–".

9.5 Relation to testing

In the case of provision of ISS, the testing device may select the test cases that apply to the implementation under test (IUT).



Annex A
(informative)

Relationships between the DAPs, Implementation Requirements and Terminal Characteristics

Figure A.1 illustrates the relationships between the various components of the T.500-Series Recommendations.

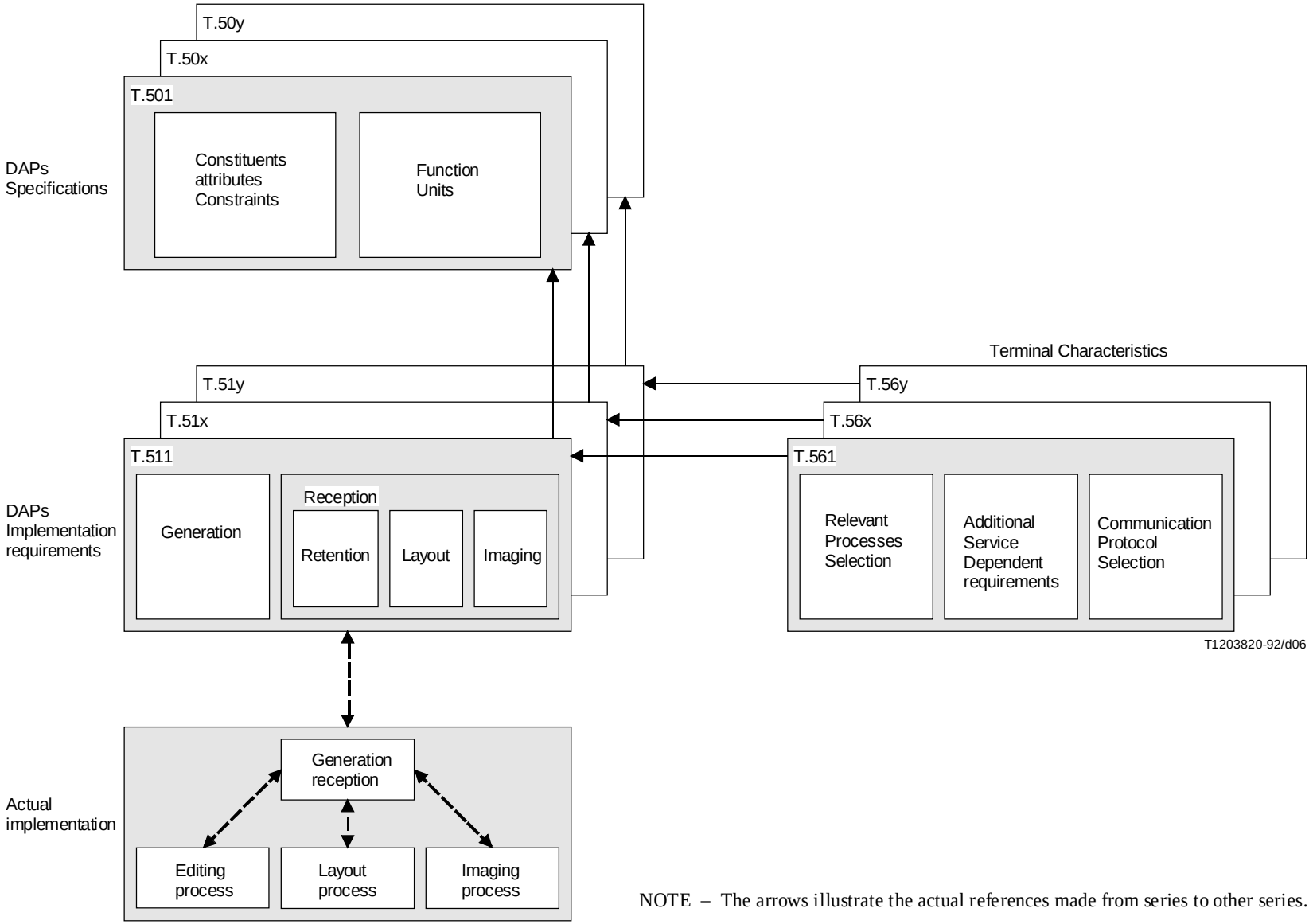
At the top of Figure A.1 is represented the set of Recommendations defining Document Application Profiles specifications: T.501, 50x... These Recommendations include the specification of the constituent constraints.

Each DAP specification refers to DAP implementation requirements which are represented in the middle of the figure: T.511, T.51x... Each T.51x Recommendation is dedicated to one DAP specification and contains, for that DAP, the definition of the function units allowed by the DAP and the minimum requirements (DMIR) for the processes involved: generation, retention, layout and imaging.

For one given application or service, there is one Recommendation of the T.560-Series which defines Terminal Characteristics by:

- selecting the DAP specifications which are allowed by this service;
- for each DAP specification, selecting the relevant processes which can be used;
- for each relevant process, specifying additional service dependent requirements that may apply,
- defining the application minimum implementation requirements (AMIR) that all implementations must satisfy whatever the DAP actually used.

The bottom of the figure represents the actual implementation statement. This corresponds to the actual features which are implemented and is outside the scope of the T.500-Series Recommendations. Indeed, the mapping between the FUs as specified by the DAP specification and the actual features depends on individual implementation and these Recommendations do not provide any guidance for such mapping. However, it can be interesting, mainly for testing purposes, to specify a form identifying all the possible FUs and the corresponding actually implemented features. Such a form could be filled by manufacturers to describe their real implementations. This leads to the definition of a proforma called “Implementation Support Statement” (ISS) which is defined, for every DAP, in the corresponding DAP implementation requirement. Additional service dependent requirements as specified by T.560-Series Recommendations may lead to some extend to this ISS proforma.



NOTE – The arrows illustrate the actual references made from series to other series.

FIGURE A.1/T.510

Relationships between DAPs, implentation requirements and terminal characteristics