

HC 4016



NETLINK Cook-book

NK/5/FNS/T/1/2.1

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1 Executive summary

This document aims at providing to the reader a quick reference to organisational and technical aspects to be taken into account when implementing a project dealing with interoperable health cards.

The document is based on the Netlink (France, Germany, Italy, Canada/Quebec) and G8 (USA, Japan) group recommendations and suggestions, in order to assure PDC interoperability at international level.

To know the complete framework of the Netlink architecture, the reader must refer to the “Netlink Requirements for interoperability (NK/2/ZI/A/3/2.1)” document.

The level of interoperability intended by this “cook book” is a basic one which guarantees free read of internationally recognised (and coded) administrative and emergency data.

The writing of the data in the PDC, the access to protected data, and the usage of the HPC for mutual authentication purpose, as defined in the “Netlink Requirements for interoperability (NK/2/ZI/A/3/2.1)” document, are out of the scope of this document.

2 Document history

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NK/5/FNS/T/1/0.2 08.02.00	<ul style="list-style-type: none"> integrating decisions of 2nd WP5 meeting (18th January 2000) and referencing the “Netlink requirements for interoperability v. 2.0” document (NK/2/ZI/A/3/2.0)
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3 Glossary

AID	= Application Identifier
ATR	= Answer-to-Reset
CH	= Cardholder
DO	= Data Object
DF	= Dedicated File
DI	= Baud rate adjustment factor
EF	= Elementary File
FCI	= File Control Information
FI	= Clock rate conversion factor
FID	= File Identifier
HB	= Historical Bytes
HP	= Health Professional
HPC	= Health Professional Card
ICC	= Integrated Circuit(s) Card
ICCSN	= ICC Serial Number
ID	= Identifier
IFD	= Interface Device
IFSC	= Information Field Size Card
IFSD	= Information Field Size Device
IIN	= Issuer Identification Number
MF	= Master File
MII	= Major Industry Identifier
NRI	= Netlink “Requirements for interoperability” document
P	= Patient
PDC	= Patient Data Card
PIN	= Personal Identification Number
PPS	= Protocol Parameter Selection
RD	= Reference Data
RND	= Random Number
SN	= Serial Number

4 PDC characteristics

This chapter describes the minimum characteristics needed by PDC to be interoperable. It refers to the Netlink “Requirements for interoperability document” (*NRI*).

4.1 Physical layer

PDC's are contact based cards compliant to ISO/IEC 7816-1, 2, 3, 4, 5 and 6. The card size is ID-1. PDC's may be 3Volt- or 5Volt-cards.

4.2 ATR

The Answer-to-Reset (ATR) must comply with ISO/IEC 7816-3 (2nd edition). Refer to *NRI chapter 4.5.2.1* for the description of the ATR structure.

It is mandatory to code the ATR “Card Profile Data Object” inside the Historical Bytes.

- When this data object is not present in the Historical Bytes, the card supports only the implicit application selection
- When this object is coded TCP='31'hex and CP='80'hex (refer to *NRI*), the PDC supports the Netlink application selection via AID.

4.3 Transmission layer

The transmission protocol supported by the card shall be either

- the half-duplex character transmission protocol T=0 or
- the half-duplex block transmission protocol T=1 or
- both.

The protocol should be expressed in the ATR.

Refer to *NRI paragraph 4.5.2.1* for the recommended values of IFSD (254 bytes) and IFSC (128 bytes).

4.4 Supported commands

The PDC must support the minimum subset of ISO 7816 commands as described in *NRI chapter 4.7.1*.

4.4.1 Select File command

The PDC must support one of the two ways of selecting the Netlink directory:

4.4.1.1 Select by AID

CLA	'00'
INS	'A4' = SELECT FILE
P1	'04' = DF selection by AID
P2	'00'
Lc/P3	'05' = Length of subsequent data field
Data field	'A000000073' = AID of Netlink-application field
Le	Empty

Tab. 1: SELECT FILE command for application selection by AID

Data field	Empty
SW1-SW2	'9000' or '61xx' normal response, or specific status bytes

Tab. 2: SELECT FILE response

4.4.1.2 Select by ID

CLA	'00'
INS	'A4' = SELECT FILE
P1	'00'
P2	'00'
Lc/P3	'02' = Length of subsequent data field
Data field	ID of EF/DF
Le	Empty

Tab. 3: SELECT FILE command for EF/DF selection by ID

Data field	Empty
SW1-SW2	'9000' or '61xx' normal response, or specific status bytes

Tab. 4: SELECT FILE response

4.4.2 Read binary command

The PDC must support the following ISO command to read the EF content:

CLA	'00'
INS	'B0' = READ BINARY
P1,P2	'0000' or offset
Lc	Empty
Data field	Empty
Le/P3	Number of bytes to be read

Tab. 5: READ BINARY command

The PDC must support a **P3** value of at least hex'F8'.

Data field	Global data objects
SW1-SW2	'9000' or '61xx' normal response, or specific status bytes

Tab. 6: READ BINARY response

4.5 File structure and access

The file structure of an interoperable PDC is accurately described in *NRI chapter 4.5.2.2*.

The *PDC* must contain:

- a DF (named DF.NETLINK) that can be accessed, depending on the card capabilities:
 - using the command SELECT_FILE by AID (with AID= 'A000000073'hex) or
 - the command SELECT_FILE by ID. In this case the ID can be found inside the EF.Dir ('2F00'hex) at MF level.

Inside the *DF.NETLINK* the following EF's must be present:

- EF.Dir ('2F00'hex) containing the ID of the EF.NETLINK;
- EF.Netlink

The content of the *EF.NETLINK* is defined as the ID's and paths of the Patient Files (EF's) containing the patient's data of the G8-interoperability-dataset (refer to the example below). The first byte of the EF.NETLINK is the tag '30'hex, followed by the length of the data contained in the EF.

The *Patient files* selection and structure are described in detail in *NRI chapter 8.5.2.2 e 8.5.2.3*.

Each patient EF can be accessed first of all selecting the DF using:

- the command SELECT_FILE with AID (if the field "dFName" is specified inside the EF.NETLINK), or
- the command SELECT_FILE with ID (if the field "dFID" is specified inside the EF.NETLINK);

then

- selecting the EF using the command SELECT_FILE with ID specified in the field "eFID" inside the EF.NETLINK.

There are three types of internationally recognised Patient Files (EF's):

- *Card data*, containing one or more Groups belonging to the international Card dataset (refer to *NRI annex D table 41*).
- *Administrative data*, containing one or more Groups belonging to the international Administrative dataset (refer to *NRI annex D table 42*).
- *Emergency data*, containing one or more Groups belonging to the international Emergency dataset (refer to *NRI annex D table 43*).

The following rules apply to the Patient files structure:

- The data structure is coded according to BER-TLV of ASN.1.
- All tagged object are defined as IMPLICIT.
- In each EF the first byte is the coded tag for SET ('31') followed by the coded length of the groups included in the value field.

- If national data have to be added in the Administrative and Emergency EF's, it is strongly recommended to use Groups items with tag in the range "B0 to BF".

Apart from the *Card*, *Administrative* and *Emergency* datasets, the PDC can contain national (not interoperable) DF's and/or EF's.

4.6 Common verification procedure

The acceptance of the PDC requires mutual trust between the systems of the countries involved.

Refer to *NRI chapter 8.5.2.4* for the basic conventions that should be established to guarantee the mutual trust.

5 Application

5.1 Accepting PDC

The application must be able to accept different types of PDCs, seen as black boxes able to answer the minimum set of commands described in chapter 6.4 above.

The PDC can support protocol T=0 or T=1, and the application must be able to accept both types of cards.

The architecture used to read the PDC is national choice. *NRI chapter 4.5.2* describes the advantages of using an PC/SC compliant ICC service provider (or similar architecture) supporting the application independent card services as described in ISO 7816-4.

5.2 Reading patient data

The detailed flow that the application must follow to read the internationally recognised patient data is described in *NRI chapter 4.5.2.2*.

- Insertion of the PDC in the IFD
- Reset of the PDC that returns the ATR
- Selection of the NETLINK Directory
If the 'Card service data' object is present in Historical Bytes (tag '3180'), the PDC supports the application-independent card services as defined in ISO/IEC 7816-4:
 - SELECT_FILE by AID=A000000073'hex
 - Else
 - SELECT_FILE EF.Dir in the MF (ID='2F00')
 - READ_BINARY EF.Dir
 - Get the ApplicationIdentifier object corresponding to NETLINK (field with tag '4F')
 - Get DF.NETLINK path (field with tag '51')
 - SELECT_FILE by ID
- Selection of the EF.NETLINK file
 - Select EF.Dir by SELECT_FILE command with ID='2F00'
 - Read EF.Dir by READ_BINARY command
 - Get the ApplicationIdentifier object corresponding to NETLINK (field with tag '4F')
 - Get EF.NETLINK short path (2 bytes inside the field with tag '51')
 - Select the EF.NETLINK by SELECT_FILE command by ID
 - Obtain all paths to the EF's containing free readable data (see NETLINK_DataSet_EFPath structure in *NRI chapter 4.5.2.2*)
- For all the EF's listed in the EF.NETLINK
 - If the "dFID" field is specified
 - Select the DF using the command SELECT_FILE by ID

- If the “dFName” field is specified
 - Select the DF using the command SELECT_FILE by AID
 - Select the EF using the SELECT_FILE by ID command (refer to field “eFID”)
 - Read the EF content by READ_BINARY command
- Return PDC data to the application

The first byte of the EF is the tag ‘31’hex, followed by the length of the data (i.e. all patient data contained in this EF).

5.3 Decoding patient data

The Patient files contain data in TLV format. It is up to the client application to extract and interpret the TLV objects contained in the returned buffer.

The format of the data in the Value field can be of different types.

Refer to the *NRI Annex D Dataset in table form* for the 3 tables describing the types of data that can be found inside the Patient files.

Refer to the *NRI Annex D Dataset in ASN.1 form* for a formal description of the types of data that can be found inside the Patient files.

5.4 Displaying patient data

The application must be able to display all international data stored in the PDC. Refer to *NRI chapter 4.5.2.4 and Annex F* for some recommendations for the visualisation of the G8 interoperable dataset.

5.5 Functional scenarios

The application should refer to the scenarios described in *NRI chapter 8.2*.

6 Examples of TLV coding

In order to simplify the achievement of an effective interoperability some examples of Elementary Files content (TLV coding) can be found below.

6.1 EF.DIR

An example of the content of EF.Dir (inside the DF.Netlink) follows (refer to *NRI chapter 4.5.2.2*):

Content

TAG	Length in hex	Data Type	Data	Contents	Comment
61	14			SET tag	
4F	05	B	A0 00 00 00 73	RID	NETLINK RID

51	02	B	00 01	EF ID	EF.NETLINK
73	07			Discretionary Data	
80	01	B	00	Card Application Type	Admin & Clinical
81	02	N	10	Card Application Version	1.0

File dump

```

0 : 61 14 4F 05 A0 00 00 00 73 51 02 00 01 73 07
10 : 01 00 81 02 31 30

```

6.2 EF.NETLINK

An example of the content of EF.Netlink follows (refer to *NRI chapter 4.5.2.2*). Note that the DF's containing the Card and Admin files must be addressed using the Select by ID command; on the contrary the DF containing the Emergency file must be addressed using the Select by AID command.

TAG	Length in hex	Data Type	Data	Contents	Comment
30	24			SET tag	
A0	0A			Card File Identifier	
31	08				sequence
81	02	B	D0 00	DF ID	
82	02	B	00 10	EF ID	
A1	0A			Admin File Identifier	
31	08				sequence
81	02	B	D0 01	DF ID	
82	02	B	00 10	EF ID	
A2	0A			Clinical File Identifier	
31	08				sequence
80	02	B	D3 92	AID	
82	02	B	00 10	EF ID	

File Dump

```

0 : 30 24 A0 0A 31 08 81 02 D0 00 82 02 D0 03 A1 0A
10 : 31 08 81 02 D1 00 82 02 D1 01 A2 0A 31 08 80 02
20 : D3 92 82 02 D2 01

```

6.3 Card EF

An example of the content of Card EF follows (refer to *NRI Annex D table 41*):

Contents

TAG	Length in hex	Data Type	Data	Contents	Comment
31	3E			SET Tag	
61	12			Card Application Identifier	
31	10			sequence	
4F	05	B	A000000073	RID	Netlink
73	07			Discretionary Data	
80	01	B	00	Card Application Type	Admin and clinical
81	02	B	30 31	Version	0.1
A0	13			Card Issuer Identifier	
80	02	B	38 30	Major Industry Identifier	Health Care
81	03	B	33 38 30	Country Code	
82	05	B	38 30 30 30 31	Issuer Identifier	
83	01	B	02	Check Digit	

File Dump

```

0 : 31 3E 61 12 31 10 4F 05 A0 00 00 00 73 73 07 80
10 : 01 00 81 02 30 31 A0 13 80 02 38 30 81 03 33 38
20 : 30 82 05 38 30 30 30 31 83 01 02

```

6.4 Administrative File*Contents*

TAG	Length in hex	Data Type	Data	Contents	Comment
31	81CA			SET Tag	
A0	1C			Patient Identifications	
31	1A			Patient Identification	
81	03	A	COD	Patient Identifier	
A0	13			Issuer of Patient Identifier	
80	02	N	80	Major Industry Identifier	Health Care
81	03	N	380	Country Code	Italy
82	05	N	80001	Issuer Identifier	
83	01	N	3	Check Digit	
A1	10			Name Detail	
A5	07			Forenames	
04	05	A	Mario	Forename	
87	05	A	Rossi	Surname at birth	
A3	0D			Birth details	
80	08	D	20000129	Date of birth	yyyymmdd
81	01	B	1	Sex	Male
A4	1E			Address Details	
31	1C			Address Detail	
80	01	B	00	Status	Current home
A1	05			Address Structure	
82	03	N	380	Country Code	
A2	10			Telecom Structure	
A0	0E			Phone numbers	
12	0C	N	390239393939	Phone number	
A5	30			Contact Details	
31	2E			Contact Detail	
80	03	A	PPP	Name	
A2	17				
82	03	N	380	Country code	
A0	10			Addresses Text	
04	0E	A	Roma Via Appia	Address Text	
A3	0E			Telecom Structure	
A0	0C	N		Phone numbers	
12	0A	N	3906303030	Phone number	
B1	37			National data (not interoperable)	

File Dump

```

0 : 31 81 CA A0 1C 31 1A 81 03 43 4F 44 A0 13 80 02
10 : 38 30 81 03 33 38 30 82 05 38 30 30 30 31 83 01
20 : 33 A1 10 A5 07 04 05 4D 61 72 69 6F 87 05 52 6F
30 : 73 73 69 A3 0D 80 08 32 30 30 30 30 31 32 39 81
40 : 01 01 A4 1E 31 1C 80 01 00 A1 05 82 03 33 38 30
50 : A2 10 A0 0E 12 0C 33 39 30 32 33 39 33 39 33 39
60 : 33 39 A5 30 31 2E 80 03 50 50 50 A2 17 82 03 33
70 : 38 30 A0 10 04 0E 52 6F 6D 61 20 56 69 61 20 41

```

```

80 : 70 70 69 61 A3 0E A0 0C 12 0A 33 39 30 36 33 30
90 : 33 30 33 30 B1 37 80 08 32 30 30 30 30 36 31 39
A0 : A1 2B 80 03 33 38 30 81 10 34 41 30 32 30 30 30
B0 : 30 30 30 30 33 30 30 31 30 82 12 46 49 4E 53 49
C0 : 45 4C 30 31 35 20 48 50 43 41 4D 30 31

```

6.5 Clinical File

Contents

TAG	Length in hex	Data Type	Data	Contents	Comment
31	81A4			SET Tag	
A0	2E			Coded clinical details	
31	2C			Coded clinical detail	
80	02	N	76	Clinical Emergency Category	Allergy eggs
81	01	B	01	Clinical Indicator	present
84	09	A	free text	Clinical Text	
85	08	A	20000619	Clinical Entry Date	yyyymmdd
A6	0E			Clinical Author	
81	05	N	11111	Author identifier	
82	05	A	Rossi	Author Name	
A1	09			Blood Group and Transfusion Details	
A0	07			Blood Group	
80	02	A	AB	ABO Blood group	
81	01	A	+	Rhesus Factor	
A3	2E			Medication Details	
31	2C			Medication Detail	
80	02	A	00	Medication Emergency Category	Other drugs
81	01	B	04	Medication Indicator	Present Medication
83	07	A	aaaaaaaa	Medication Drug Name	
88	08	A	20000619	Medication Entry Date	yyyymmdd
A2	10			Medication coding structures	
31	0E			Medication coding structure	
81	07	A	44444444	Medication Code	
82	03	A	AIC	Coding scheme acronym	
A6	37			Update Details	
80	08	A	20000619	Date of last clinical update	
A1	2B			Responsible party	
80	03	N	380	Responsible party country	
81	10	N	4F02000000029010	Responsible party identifier	
82	12	A	FINSIEL014 HPCSA02	Responsible party name	

File Dump

```

0 : 31 81 A4 A0 2E 31 2C 80 02 37 36 81 01 01 84 09
10 : 66 72 65 65 20 74 65 78 74 85 08 32 30 30 30 30
20 : 36 31 39 A6 0E 81 05 31 31 31 31 31 82 05 52 6F
30 : 73 73 69 A1 09 A0 07 80 02 41 42 81 01 2B A3 2E
30 : 31 2C 80 02 30 30 81 01 04 83 07 61 61 61 61 61
50 : 61 61 88 08 32 30 30 30 30 36 31 39 A2 10 31 0E
60 : 81 07 34 34 34 34 34 34 34 82 03 41 49 43 A6 37
70 : 80 08 32 30 30 30 30 36 31 39 A1 2B 80 03 33 38
80 : 30 81 10 34 46 30 32 30 30 30 30 30 30 32 39
90 : 30 31 30 82 12 46 49 4E 53 49 45 4C 30 31 34 20
A0 : 48 50 43 53 41 30 32

```

7 References to public documents and applicable standards

Refer to *NRI annex A*.