

# UCTE2CIM converter & CIM2UCTE converter

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## Why, When it started ?

- For EDF R&D, it made sense to figure out :
  - if CPSM profile (answering a NERC requirement) and UCTE DEF could be compared and matched
  - if Continental Europe could have an interest to align its standard on IEC standard ...
- In 2005 : RTE financed EDF R&D on the converter between UCTE and CIM CPSM
- In May 2006, EDF presented the first result to Paris CIM User group (Converter from UCTE DEF to CIM CPSM)

## UCTE2CIM converter

# Our statement in 2006 during Paris CIM User group ...

## UCTE profile ?

UCTE → CIM (CPSM) works  
nodal topology detailed topology

CIM (CPSM) → UCTE is easily feasible  
detailed topology nodal topology

In addition to the detailed topology, the CIM accepts the nodal topology (**TopologicalNode**)

But CPSM doesn't

It could be considered to define a **UCTE profile** equivalent to the CPSM profile, but with a **nodal topology** (in addition to the detailed topology or not) and possibly other european features

# How it continued ... **CIM2UCTE converter**

- Then EDF R&D continued the study to get a CIM CPSM to UCTE DEF converter.
- In June 2007 EDF and RTE announced that this **complete** specification will be made **publicly available to CIM user group** in November 2007.

The screenshot shows a web portal interface for the CIMarchive. The main content area displays a list of documents under the heading 'Model Exchange'. The list includes the following entries:

Type	Name	Modified	Modified By
PDF	61970-454-Rev1	8/9/2007 11:32 AM	kay
PDF	cim_ug_taskforce_model_exchange_report_20051104	8/9/2007 11:32 AM	kay
PDF	Designing Model Exchange Processes paper	8/9/2007 11:32 AM	kay
Folder	Model Exchange	8/9/2007 11:32 AM	kay
PDF	Study_on_CimUcte_Formats_UCTE_DEF_CIM_CPSM	11/6/2007 4:39 PM	fred
PDF	UCTE-format	11/6/2007 4:39 PM	fred


A red circle highlights the document 'Study\_on\_CimUcte\_Formats\_UCTE\_DEF\_CIM\_CPSM' and a red arrow points to it from above.

# Methodology applied for CIM-UCTE harmonization

Draft IEC 61970: Energy Management System  
Application Program Interface (EMS-API) –

Part 452: CIM Network Applications Model Exchange  
Specification

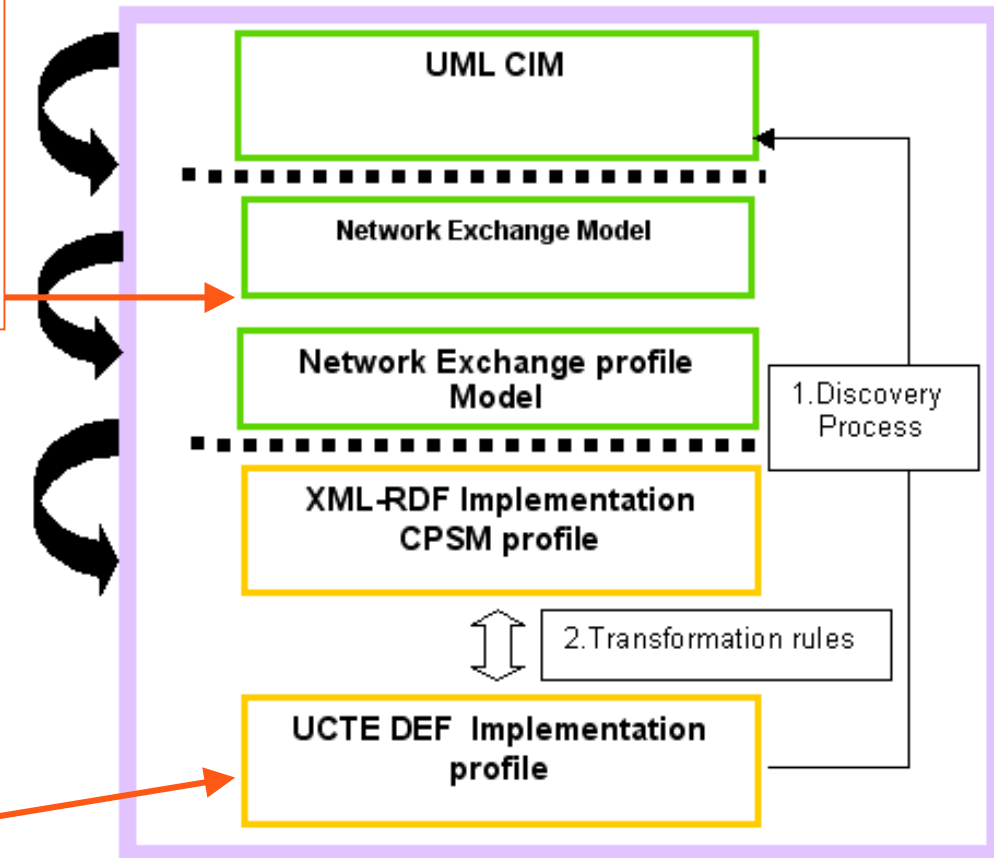
Revision 3  
2006-07-28

UCTE  
Subgroup „Network models and forecast tools“  


UCTE data exchange format for load flow and  
three phase short circuit studies

(UCTE-DEF)

Version 01 (coming into force: 2003.09.01)  
Version 02 (coming into force: 2007.05.01)



## UCTE data exchange format for load flow and three phase short circuit studies

### (UCTE-DEF)

This document describes the UCTE format adopted for data exchange and provides all the necessary instructions about its use. The data refer to load flow and three phase short circuit studies and describe the interconnected extra high voltage network. Equivalent network elements should be avoided as much as possible. **Appendix 1** contains instructions and explanations about how to use this format.

The data are contained in an unformatted standard US ASCII file without any control characters moreover it is strictly forbidden to use diacritic signs. Only the current published version of the UCTE format is to be used. It is not allowed to add non-defined information into the described sections of the file. The file is divided into blocks in which determined data are put successively in a defined manner:

## UCTE-DEF

The following blocks are defined:

- COMMENTS (C)
- NODES (N)
- LINES (L)
- 2 WINDINGS TRANSFORMERS (T)
- 2 WINDINGS TRANSFORMERS REGULATION (R)
- 2 WINDINGS TRANSFORMERS SPECIAL DESCRIPTION (optional) (TT)
- EXCHANGE POWERS (optional) (E)

Each block is introduced by a key line consisting of the two characters “##” and of the character given above in brackets. The end of a block is given by the next key line or the end of the file. No “end command” is to be used. The sequence of the blocks in the file is recommended as above.

# UCTE format

Nodes sorted by countries	Base voltage Load P, Q Generation P, Q, Pmin, Pmax, Qmin, Qmax If node PV or SL, Voltage Setpoint
Lines	Type, R, X, B, in operation / out of operation
2 Winding Transformers	R, X, B, G, in operation / out of operation
2 Winding Transformers Regulations	Tap number, voltage or phase shift increment

## Node-Branch topology (or nodal topology)

- Most of the breakers are not modelled
- Data related to the state (open/closed) of the different kinds of switches are carried by the branches
- Used in the UCTE format

## Busbar-Breaker topology (or detailed topology)

- The breakers and all switches are modelled as specific objects
- They carry the data related to their state
- Used in the CIM modelling

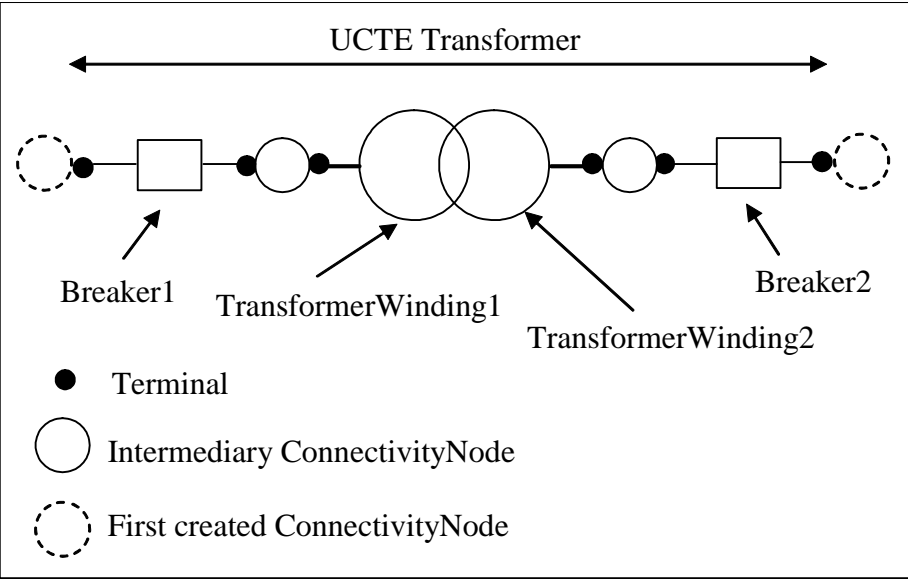
# UCTE-CIM Mapping (1)

UCTE		CIM / CPSM
Node		ConnectivityNode, BusbarSection, HostControlArea, Substation
	Base voltage	BaseVoltage, VoltageLevel
	Load	EnergyConsumer
	Generation	SynchronousMachine, GeneratingUnit
	PV Node Voltage setpoint	RegulationSchedule, Measurement

# UCTE-CIM Mapping (2)

UCTE		CIM / CPSM
	Busbar coupler	LoadBreakSwitch
Line	Transmission line	

# UCTE-CIM Mapping (3)

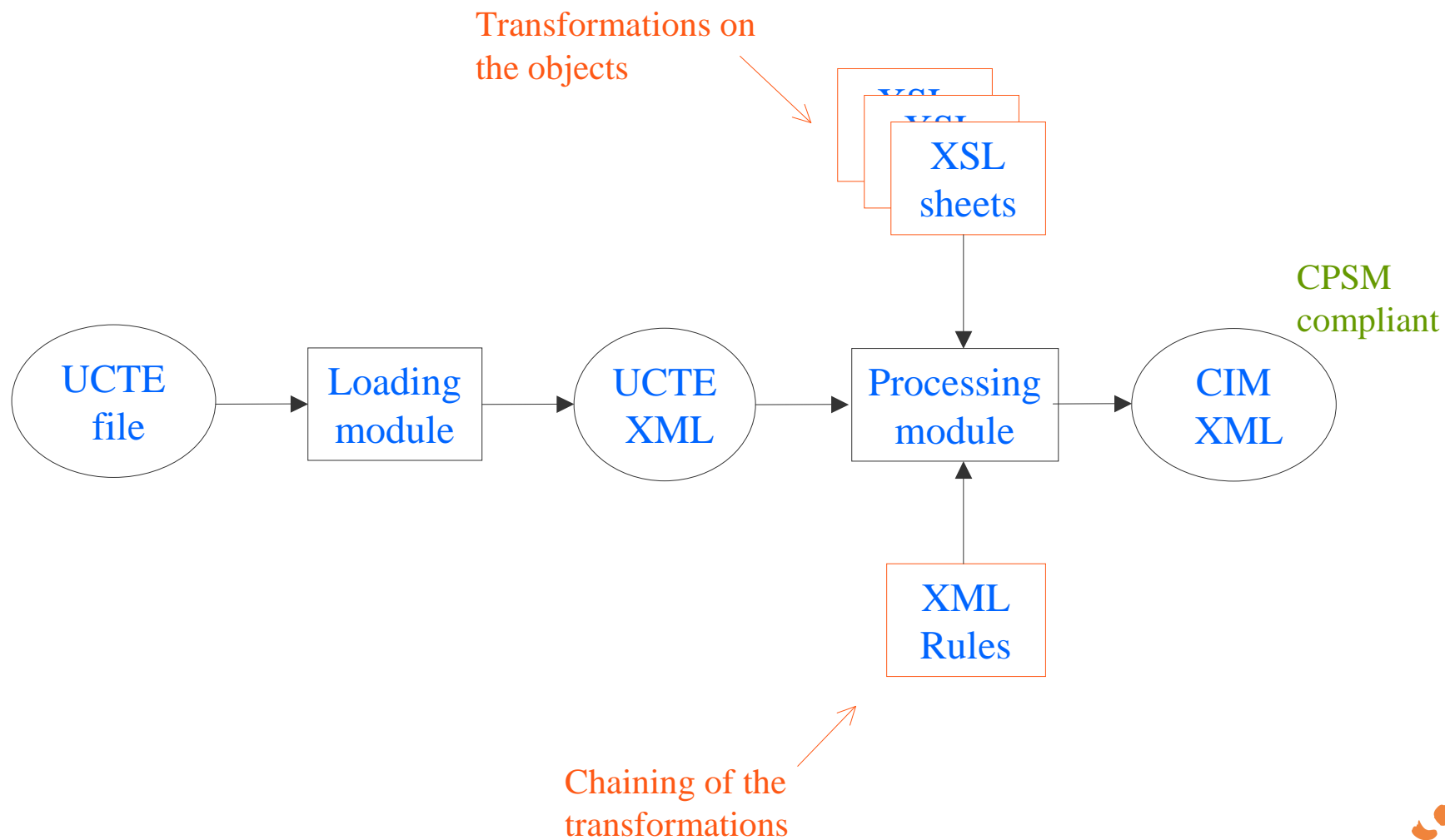
UCTE	CIM / CPSM
2 Winding Transformer	 <p style="text-align: center;">UCTE Transformer</p> <p>Breaker1    TransformerWinding1    TransformerWinding2    Breaker2</p> <p>● Terminal ○ Intermediary ConnectivityNode ○ First created ConnectivityNode</p>
2 Winding Transformer Regulation	TapChanger

# The first part of the specification is associated to the study UCTE2CIM

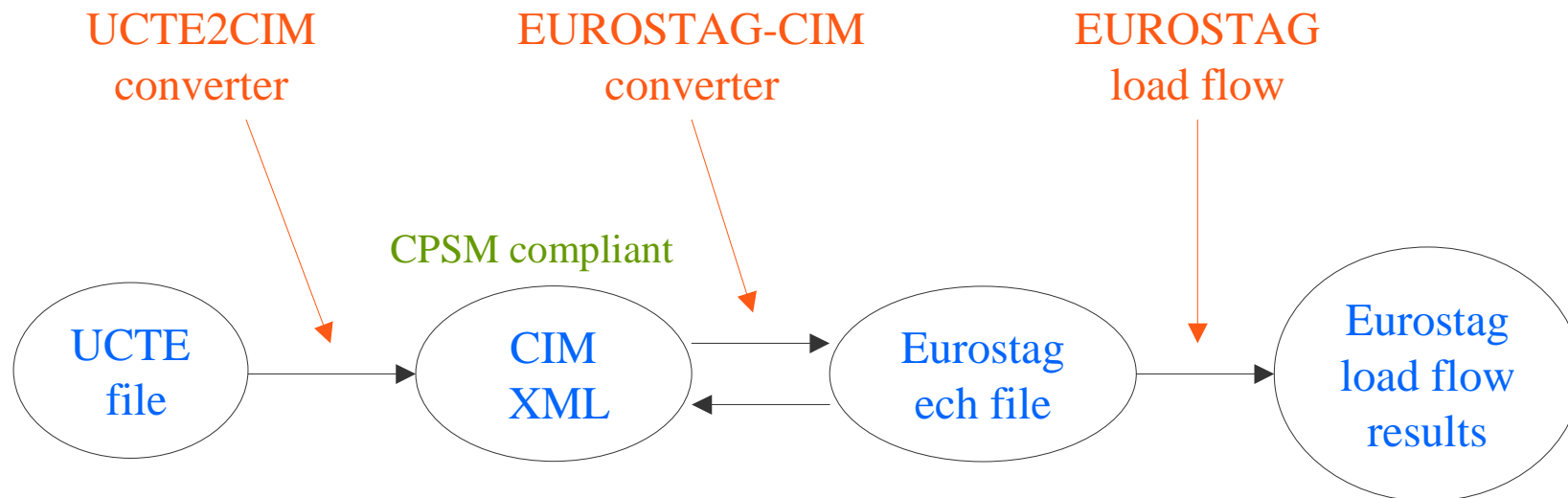
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A  
 « If ... Then  
 ...  
 Else ... »  
 specification type  
 of  
 document  
 with examples

# UCTE→CIM Converter (XSL)



# UCTE→CIM Converter validation



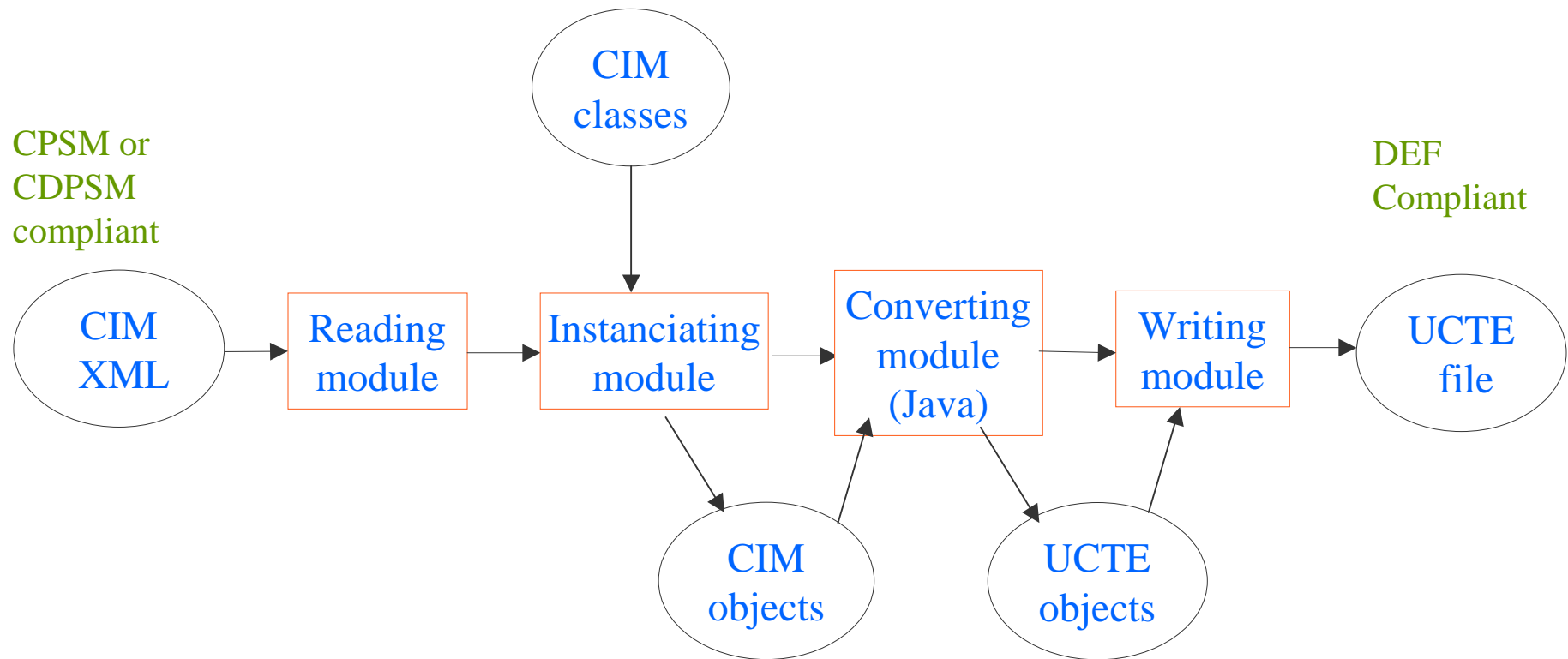
**Eurostag** : software used to study the transient stability of a transmission network. It includes a load flow calculation.

Eurostag CIM API tested during EPRI CIM interop test in 2004,2005,2006

# Then second part of the specification is associated to the study CIM2UCTE

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# CIM→UCTE Converter (Java)



# Files Tested with the converters

## Inputs

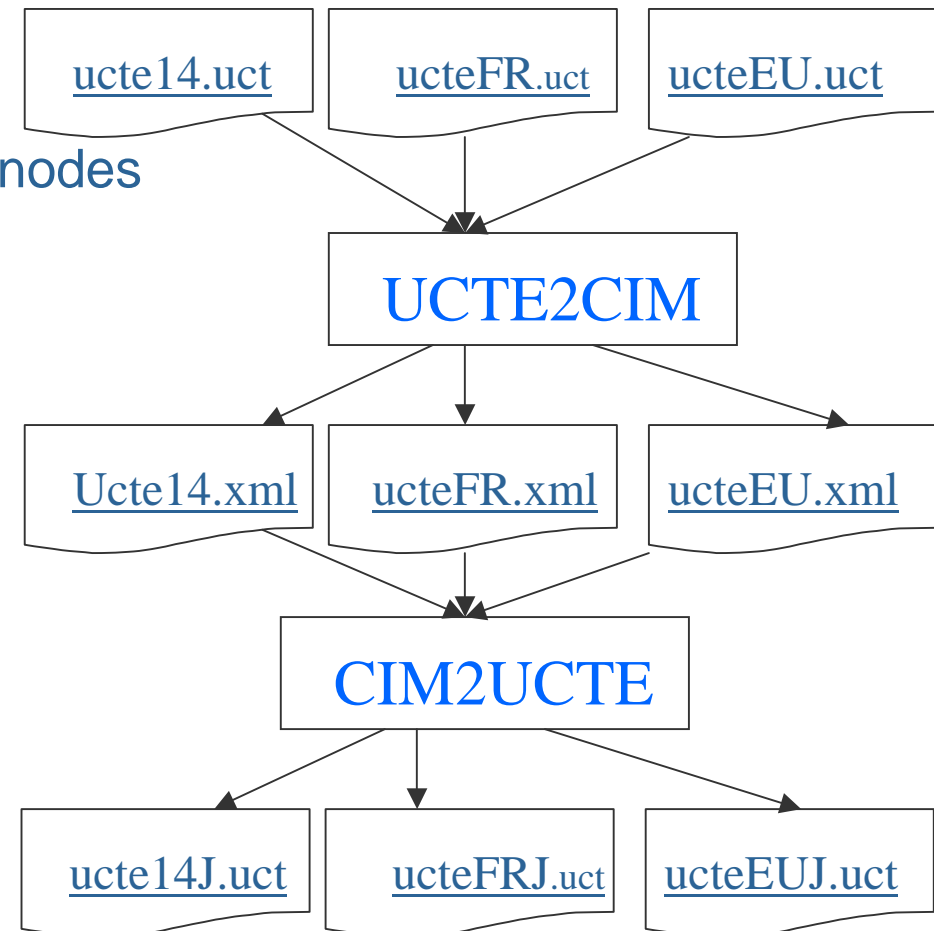
- A basic file provided by UCTE : 14 nodes
- A french UCTE file
- A European UCTE file

## Outputs

⇒ 3 xml files built with **UCTE2CIM** XSL converter

## Outputs

⇒ 3 ucte files built with **CIM2UCTE** Java converter  
+ 3 associated files  
(ucte nodes associated to which CIM Connectivity Node)




# A way to continue ... DACF v02, CPSM Rev 4

**Draft IEC 61970: Energy Management System  
Application Program Interface (EMS-API) –**

**Part 452: CIM Transmission Network Applications  
Model Exchange SpecificationProfile**

Revision 34

2006-08-292007-09-13

UCTE  
Subgroup „Network models and forecast tools“  
  
UCTE

UCTE data exchange format for load flow and  
three phase short circuit studies

(UCTE-DEF)

Version 01 (coming into force: 2003.09.01)

Version 02 (coming into force: 2007.05.01)

Another way to continue :  
giving access to the UCTE-CIM converters through a portal

The screenshot shows the EDF Research and Development portal. The header includes the EDF logo, the text "Recherche et Développement", and navigation links for "Recherche", "Annuaire", and "Portails". Below the header is a yellow banner for "Laboratoire DIGI²TAL" with the contact email "eric.lambert@edf.fr". The main content is organized into several categories:

- 1 - ENTREPOT DE RESEAUX**
  - [GEDEON](#)
  - [SELECTION DE RESEAUX](#)
- 2 - CONVERSION DE FORMAT**
  - [ASC vers CIM-CDPSM](#)
  - [CIM-CDPSM vers ASC](#)
  - [ECH vers CIM-CPSM](#)
  - [CIM-CPSM vers EGL](#)
  - [UCTE vers CIM-CPSM](#)
  - [CIM-CPSM vers UCTE](#)
  - [CIM-CDPSM vers MATLAB](#)
  - [CIM-CPSM vers EMTP](#)
- 3 - PLANIFICATION**
  - [EUROSTAG](#) libre
  - [PRAO](#) libre
  - [MOSARD](#) libre
- VISUALISATEUR DE RESEAU**
  - [CIM Viewer](#) libre
  - [MERCURY \(STRATHCLYDE\)](#)
  - [MERCURY \(local\)](#)
  - [CIMPHONY TEMPS REEL](#)
- 4 - TELECONDUITE**
  - [SITR-INPACT](#)
  - [FAR-RECONFIGURATION](#) libre
- MODELISATION**
  - [MODELE MSITE \(CIM pour EDF\)](#)
  - [MODELES DE PROCESSUS METIERS](#)
- LIENS UTILES**
  - [CIM USER GROUP](#)
  - [DIGIWIKI](#) libre
  - [BUGZILLA \(SUGGESTIONS\)](#) libre

Another way to continue :  
The converters UCTE2CIM and CIM2UCTE could be released as open source code

## The real work is starting ...

The main issues are :

- Defining what would distinguish the European profile from the CIM for Planning profile
- Having a migration path from UCTE to CIM European profile (based on tools, converters already existing)
- Having a policy in order to succeed
- Helping UCTE members to migrate their process

# Conclusion

- The specification provided by EDF Group and demonstrated with tools is one of the good starting point for harmonizing the 2 standards
- The specification document could (should) become a Technical Report for IEC wg13
- CIM-UCTE harmonization could (should) be managed like CIM-ETSO harmonization (**European Task Force regrouping UCTE and IEC experts**) with a formal liaison established between UCTE and IEC TC57
- It takes time to convince but important topics have to be anticipated if you believe in them...