

PCO

Features Overview

General Overview

Filtered Tracing

Structure Interpretation

Logging, Replay and Testcase Generation

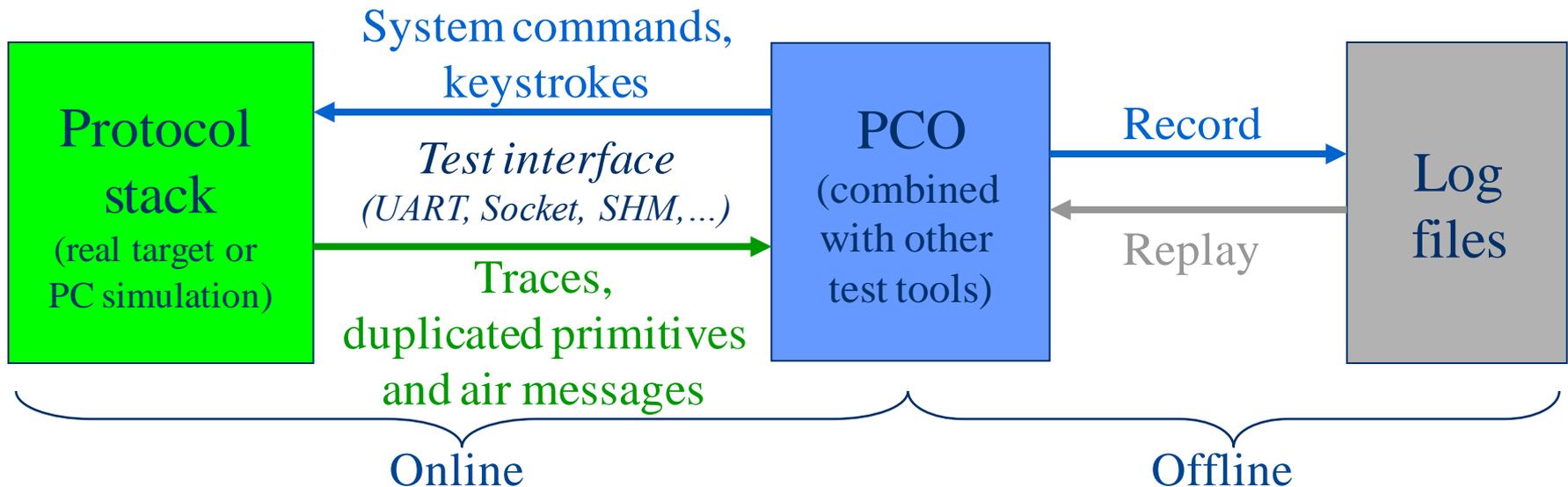
Integration with other Tools

Scripting

PCO ... features overview

General Overview

- **PCO – Point of Control and Observation**
 - ⇒ control of the PS behaviour and produced traces via system commands
 - ⇒ observation of all kinds of states and the data flow inside the PS
- **Online and offline mode available**
- **Freely combinable set of GUI applications and scriptable command line tools**
- **Open interface to derive customized viewers**
 - ⇒ e.g., a dedicated Engineering Mode Window is under development



PCO ... features overview

Filtered Tracing

- Traces, primitives and air messages can be watched ...

- ⇒ in one or more customized windows
- ⇒ synchronized among all layers (L1 and L2/3)
- ⇒ distinguishable by colors

- Compression of traces at the test interface

- Observation of dedicated parameters

- ⇒ e.g., neighbor cell count

- Various kinds of filters may be applied

- ⇒ per SAP
- ⇒ per entity
- ⇒ per primitive/air message

General	Traceclasses	Primitives
	GMM	MM
GMM	<input type="checkbox"/>	<input type="checkbox"/>
MMI	<input type="checkbox"/>	<input type="checkbox"/>
MM	<input type="checkbox"/>	<input type="checkbox"/>
RR	<input type="checkbox"/>	<input type="checkbox"/>
SMS	<input type="checkbox"/>	<input type="checkbox"/>
GRR	<input type="checkbox"/>	<input type="checkbox"/>
GRMC	<input type="checkbox"/>	<input type="checkbox"/>
SM	<input type="checkbox"/>	<input type="checkbox"/>
CC	<input type="checkbox"/>	<input type="checkbox"/>

Watch:	Don't watch:
<input type="checkbox"/> TAP	<input type="checkbox"/> PAN
<input type="checkbox"/> TDC	<input type="checkbox"/> PCO
<input type="checkbox"/> CC	<input type="checkbox"/> RCV
<input type="checkbox"/> CCD	<input type="checkbox"/> SYST
<input type="checkbox"/> CST	<input type="checkbox"/> TST
<input type="checkbox"/> DL	<input type="checkbox"/> SYST
<input type="checkbox"/> FAD	<input type="checkbox"/> TST
<input type="checkbox"/> GMM	
<input type="checkbox"/> GRMC	
<input type="checkbox"/> GRR	
<input type="checkbox"/> L1	
<input type="checkbox"/> L2R	

Air messages:

- FAC (0x07)
- GMM (0x09)
- GRMC (0x0C)
 - D_GRMC_UL_ACK (0x09)
 - U_GRMC_CTRL_ACK (0x01)
 - U_GRMC_DL_ACK (0x02)
 - U_GRMC_RESOURCE_REQ (0x05)
 - U_GRMC_UL_DUMMY (0x03)
- GRR (0x0B)
- MM (0x02)

PCO ... features overview

Structure Interpretation

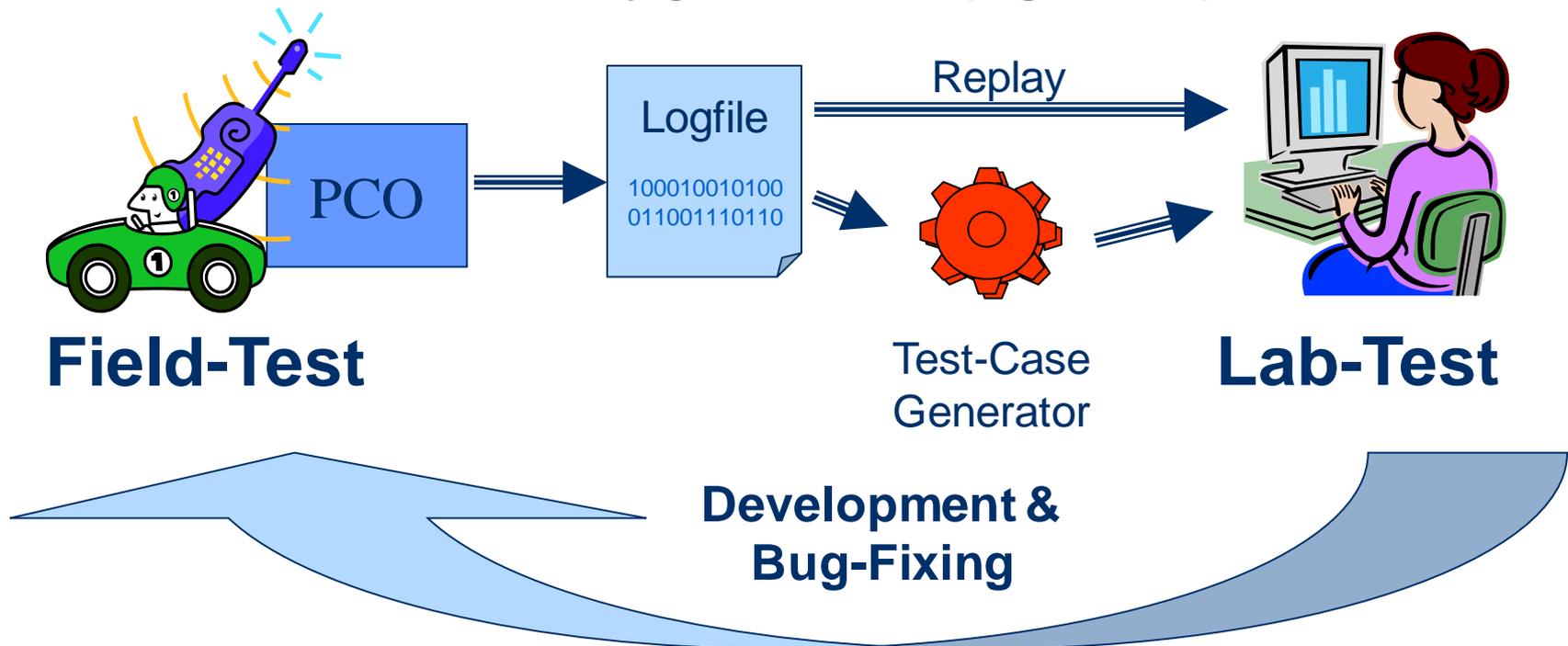
- Hexdumps of duplicated primitives are interpreted
 - ⇒ the individual values of elements are shown
 - ⇒ ... together with cleartext explanations
- Air messages are decoded
 - ⇒ and interpreted as well

Element	Value	Cleartext/Info
RR_DATA_IND	OPC: 0x80034006	
d1 (dummy, not used)	02	
d2 (dummy, not used)	00	
D_ALERT	01 (258*00) 01 01 03 01 0A 01 08 (142*00)	<AIR MESSAGE>
msg_type (Message Type)	01	
facility (Facility)		<element invalid/not present>
progress (Progress indicator)	01 03 01 0A 01 08 00 00	<Sub structure>
cs (Coding standard)	03	standard defined for the GSM PLMNS as network beyond interworking point
loc (Location)	0A	network beyond interworking point
progress_desc (Progress de..)	08	In-band information or appropriate pat.
user_user (User-user)		<element invalid/not present>
MMCC_DATA_IND	OPC: 0x80004007	
d1 (dummy, not used)	02	
d2 (dummy, not used)	00	
D_ALERT	01 (258*00) 01 01 03 01 0A 01 08 (142*00)	<AIR MESSAGE>

PCO ... features overview

Logging, Replay and Testcase Generation

- All data received via the test interface can be
 - ⇒ recorded into logfiles
 - ⇒ replayed, e.g., with different filter settings
 - ⇒ used to automatically generate new (regression) test cases



PCO ... features overview

Integration with other Tools (1)

- Export functions for various file formats (e.g., ASCII) exist
- Already a lot of tools can be directly used on the current viewer entries ..

⇒ for example MSCView to watch the corresponding message flow

The image shows two overlapping windows. The top window is 'main.svc - Live data stream' with a table of log entries. The bottom window is 'pco_out.dbg - MscView' showing a sequence diagram.

T	Nr	Time	End	Name	Rcv	Content
	1015	13:00:01:177	L1	<TRACE>	PCO	--- IN:##OPC:0x0051##
	1016	13:00:01:177	L1	<TRACE>	PCO	SA_I 14326 0 124 (136 139) 3087 474
	1017	13:00:01:193	DL	<TRACE>		
	1018	13:00:01:193	RR	<TRACE>		
	1019	13:00:01:193	RR	<TRACE>		
	1020	13:00:01:193	RR	<TRACE>		
	1021	13:00:01:193	RR	<TRACE>		
	1022	13:00:01:209	RR	<TRACE>		
	1023	13:00:01:209	RR	<TRACE>		
	1024	13:00:01:209	MM	<TRACE>		
	1025	13:00:01:209	MM	<TRACE>		
	1026	13:00:01:224	MM	<TRACE>		
	1027	13:00:01:224	MM	<TRACE>		
	1028	13:00:01:224	MM	<TRACE>		
	1029	13:00:01:224	MM	<TRACE>		
	1030	13:00:01:224	MM	<TRACE>		
	1031	13:00:01:224	MM	<TRACE>		
	1032	13:00:01:240	MM	<TRACE>		
	1033	13:00:01:287	MM	<TRACE>		
	1034	13:00:01:287	L1	<TRACE>		
	1035	13:00:01:287	L1	<TRACE>		
	1036	13:00:01:287	L1	<TRACE>		
	1037	13:00:01:302	L1	<TRACE>		
	1038	13:00:01:302	L1	<TRACE>		
	1039	13:00:01:302	MM	<TRACE>		

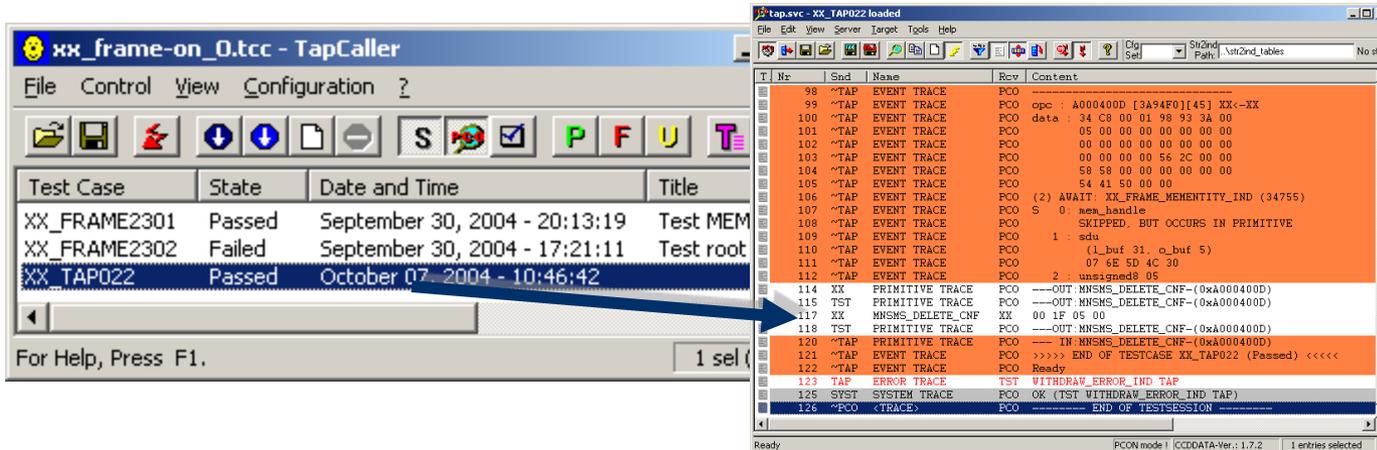
The MSCView window shows a sequence diagram with participants CC, MM, RR, DL, and ALR. The messages are as follows:

- DL to MM: DL_UNITDATA_REQ-(0x80064003)
- MM to DL: DL_DATA_IND-(0x80060003)
- RR to MM: RR_DATA_IND-(0x80034006)
- MM to RR: MMCC_DATA_IND-(0x80004007)
- RR to MM: RR_DATA_REQ-(0x80020006)
- MM to RR: MMCC_DATA_REQ-(0x80020007)
- DL to MM: DL_DATA_REQ-(0x80054003)
- MM to DL: MMCC_RELEASE_REQ-(0x80010007)
- ALR to DL: MPH_UNITDATA_IND-(0x1709)
- DL to ALR: MPH_NEIGHBOURCELL_REQ-(0x5704)

PCO ... features overview

Integration with other Tools (2)

- Many tools exist which use the same framework as PCO
 - ⇒ ... and can, therefore, run in parallel as needed
- Some of them are usually started automatically by PCO
 - ⇒ ... for example the virtual mobile „xPanel“
- In further cases parts of PCO are started by other applications
 - ⇒ ... like the Test Application Process:



Scripting

- **PCO also comes with various command line tools ...**
 - ⇒ to control the logging/replay process
 - ⇒ to do converting
 - ⇒ to send system commands to the protocol stack
 - ⇒ ...
- **The PCO Reaction Viewer component ...**
 - ⇒ monitors incoming traces
 - ⇒ ... and starts actions triggered by rules defined in a dedicated XML file, e.g.:
 - ◆ sending of system commands
 - ◆ starting of applications

Live Demonstration

Thanx for your patience 😊