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Next generation UICC-Terminal interface, Technology choice considerations

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Agenda

- The “Multi-protocol interface” proposal analysis
  - T=10 History
  - T=10 and T=11 claimed advantages
  - T=10 and T=11 inherent limitations
  - Open questions
  - Conclusions

T=10 History

- “Synchronous T=1” was introduced to ISO/IEC SC17 WG4 in 2004 as a proposed enhancement to ISO 7816-3
  - The proposal was rejected due to a lack of tangible benefits
  - The feasibility of the concept was not proven
- “Synchronous T=1” was also presented to ETSI SCP in 2004 as a proposal for the new UICC / Terminal interface
  - SCP did not go forward with the proposal as the interest was not clear
- The proposal was re-presented as a solution to fulfill the SCP requirements for the High Speed protocol in 2005
  - It was rejected by vote in January 2006
- A new proposal named “T=10/11” has been introduced in SCP Plenary in September 2006
  - No technical discussion has taken place in ETSI SCP about this proposal
  - The “T=10” part of the proposal corresponds to the former “Synchronous T=1”

T=10 and T=11 claimed advantages

- T=10 reduces the Clock-To-Data ratio to 1
  - It proposes to use a new clock which could go up to 20MHz
- T=11 reduces the transport overhead compared to T=10
- Latest update allows variable packet lengths, with start bit and End Of Block definition
  - This opens the possibility to carry other protocols than T=10 APDUs

T=10/11 protocol inherent limitations

- Like T=0 or T=1, the T=10 transport layer has an important overhead (30%)

- T=10/11 inherits some existing ISO 7816-3 interface limitations
  - The transport layer requires processor involvement (and fast availability)
  - But T=10/11 will be routed through the Digital Baseband, which has low availability
  - No benefits from well structured protocols: testability, interoperability, flexibility
  - The existing ISO 7816-3 interface has already been pushed to the limits of its capabilities during the past 25 years
- Projected performances for T=10
  - For an average transfer size of 100 bytes, and a low latency of 1 ms, even if data transfer speed was infinite:
    - ***Maximum theoretical interface speed ~ 100 x 8 / 1ms = 800kb/s***
  - To fulfill the basic ETSI-SCP requirements of 8 Mb/s, the total latency should be less than 125µs
    - ***This is clearly not feasible if CPU involvement is required (needing several ms)***
- Introduction of new features will force a revision of the baseband CPU.

Shortcomings of the proposal

- There is no mechanism to guarantee minimum performance
  - Some use cases, e.g. real time data encryption-decryption, are compromised
  - Inconsistency in user experience
- Existing protocol stacks cannot be reused as is on “T=11”
  - Each vendor will have to develop and maintain his own specific implementations
- Support of basic building blocks is optional: do we want to go again in the Simtoolkit variability nightmare?
- Specs are too far from stability
  - Final complexity and consistency can not be foreseen yet
  - Cost can not be evaluated
  - Time to market can not be safely assessed
- Hardware: too early to conclude on the real impact on H/W

Open questions

- Proactive capabilities: control and efficiency of the proactive mechanism is unclear
- Why do we need 2 clocks? What is the relationship between the 2 clocks?
- Have potential ECM problems due to inter-modulation between the 2 clocks been investigated?
- Has the robustness of the interface been studied?
- Different negotiable speeds:
  - Rules and constraints to select a speed? Dependency to power budget?
  - Impact on interoperability and testing complexity?
- How can the processor clock be running at less than 5 MHz while data may arrive at 20 MHz?
- What does it bring to encapsulate USB if mass storage and EEM need to be reinvented?
- If the intention is to implement T=11, why keep “T=10”. Why a dangerous 2 phases approach? (T=10 has no benefits for operators and users)
- What is the compatibility between T=10 and T=11?

Tentative timeframe for T=11

Standardization completion (1year)

Feasibility and proto for SIM (1year)

Launch new silicon on SIMs

Feasibility and proto for handsets (1year)

Launch new silicon on handsets

18 months delay

Conclusion 1

- T=10/11 inherent limitations will pose strong problems
- T=10/11 benefits are questionable given the T=1 history
- T=10/11 impose to reinvent features that already exist with other protocols
  - No synergies with existing stacks
  - No possibility to take advantages of existing development and test tools
- T=10/11 has no synergy with any other existing interface
  - The UICC as an operator device would be confined forever in the handset
  - ***All the possibilities of fast extension of the UICC to other devices and functions are lost***
- T=10/11 is at its very beginning thus far from stability
  - Reaching acceptable maturity will take at least 4 or 5 meetings cycles
  - Cost of implementation can not be seriously assessed
  - No Demo or feasibility ever seen

Conclusion 2: USB proposal appears clearly as the most viable solution

- An already existing interface running in millions of devices…
  - Don't reinvent the wheel: No more debugging, faster time to market
  - Take advantage of what is available in HW ands SW
- … with a lot of flexibility …
  - We can't predict which future services will succeed: Content protection, video storage, audio decryption…, so be adaptable!
- … with hardware support for the transport layer …
  - More transistors is no longer an issue with modern silicon technologies
  - Avoid dependency on the load of the host CPU
- … possibly implemented on a phone's main processor…
  - Do not touch the Digital Baseband, which already works
  - New services will be developed independently from the radio part
- … which offer guaranteed performance and maximum connectivity…
- … For which the standardisation can be considered as completed and prototyping phases well completed (at least on the SIM side)