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The Coordinated Defence Role in Civil (Telecom) Standardisation

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Abstract

The "ruthless pursuit of COTS" is increasing the penetration of unmodified COTS¹ technology and standards in the military domain. Therefore, as the defence community becomes more reliant on off the shelf products and standards, it is increasingly a stake-holder in the results of the civil process. This should lead to a motivation to be a proactive participant in the civil process by which the civil standards (and technology) are developed.

This paper presents the outcome of a recently held workshop (29th November 1999) organised by the NATO C3 Agency and hosted by the European Telecommunication Standards Institute (ETSI). The agenda, report and presentations are available at <http://www.nc3a.nato.int>. This paper discusses ETSI specifically, but the arguments and principles also apply to other standards fora.

It was proposed that there should be a coordinated action within the defence community of the Alliance with respect to civil standards which will encourage the emergence of a harmonised defence market for civil telecommunication products (COTS).

This paper will discuss the possibilities and significance of defence requirements capture within the context of civil telecommunication standards development.

Acknowledgement

Whilst the content of this paper is the responsibility of its author, the whole is necessarily influenced by the many views excellently articulated by the workshop speakers and participants.

Introduction

The role and benefits of standards (in the context of this paper, telecommunication standards specifically) are generally accepted in both the civil and defence communities. In the military context, standards enable interoperability between systems (in particular, systems of different nations operating

in a coalition setting), reduce dependence on single suppliers and permit systems to be upgraded whilst enabling interoperability with legacy systems.

In the civil market, standards enable interoperability between competing vendors, increasing the effective size of a market which provides economies of scale, in turn enabling reductions in price which in turn fuels market growth. One spectacular recent example is the mobile technology GSM, which through a regional standardisation activity created an initial market across Europe which is now global. The market size has turned the user (mobile) terminal into a commodity product (terminals are often given away). The market has grown from its inception (1991) to 450 million users currently, and is projected to grow to 1.6 billion users by the year 2010. The total number of mobile (all technologies) users is projected to exceed the number of fixed telephones by the year 2004.

Defence users already make significant use of civil standards and COTS equipment. This trend is likely to increase in the future due to continuing downward pressure on defence spending, increased 'operations other than war' (e.g. 'Peace Support Operations') and rapid advances in technology. One example within the NATO context is the adoption of ISDN standards in the NATO core network (NCN).

If these trends are accepted, defence users (and operators) should recognise that they are 'stakeholders' in civil standards and it therefore seems logical that they take a greater interest in the process by which those standards are derived, and take steps to enter their specific requirements alongside all the other user requirements.

This paper first describes a workshop organised to address this subject area, drawing from the presentations and associated discussion. The paper then goes on to discuss the issues which arise, finally making some conclusions and specific proposals for further activity.

¹ Commercial Off the Shelf Technology

Workshop

The NATO C3 Agency organised a workshop entitled "Defence Markets for Telecom Standards and Technologies". The workshop addressed the following general questions:

- How can the ETSI community capture the requirements of the military community in an effective manner?
- How can the NATO community understand the working methods and procedures of ETSI?
- How can industry effectively relate defence market requirements to civil market requirements?
- How can national defence agencies be facilitated to work within civil standards bodies?

The workshop brought together a representative community in an environment which encouraged free discussion. It was structured around a framework of presentations from both civil and defence communities.

There were 55 delegates registered, from 12 countries and 32 organisations. The breakdown by type of the organisations is shown in figure 1.

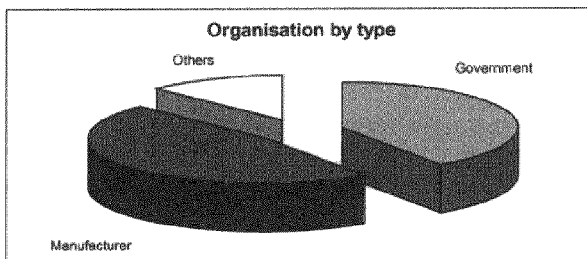


Figure 1: Organisation by Type

The breakdown of representation by country (of organisation rather than individual) is shown in the figure 2.

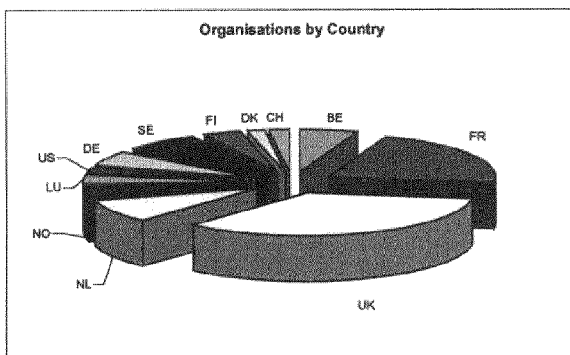


Figure 2: Organisation by Country

ETSI

ETSI is a regional telecommunication standards organisation. Its work programme is driven (and mostly funded) by its membership (730 member organisations from 50 countries, of whom 51% are manufacturers) and they in turn are driven by the perceived 'market requirement'.

Considering the diversity of members, many of whom will eventually compete in the market place to supply products and services, the challenge is always to reach consensus - which ETSI defines as "the lack of sustained opposition". Occasionally voting is required on technical issues when there is a failure to reach consensus.

ETSI is open (its work and standards are freely available at <http://www.etsi.org>) with only current temporary working documents restricted to member organisations. ETSI works in partnership and has cooperation agreements with many other organisations, for example; UMTS Forum, GSM Association, ATM Forum, IETF, WAP, IPv6.

The desire by several regions to work together for a single global standard for mobile communications, building on the success of GSM (an ETSI standard) took ETSI beyond its normal geographical region and so the 3rd Generation Partnership Project (3GPP) was established. This was created outside ETSI and overcame the limitation that ETSI members without a European base have no right to vote (although Associate members may participate in the technical work).

The 3GPP (<http://www.3gpp.org>) is a partnership of regional standards developing organisations; ETSI (Europe), T1 (US), ARIB (Japan), CWTS (Canada), TTA (Korea) and TTC (Japan) along with market representation partners (GSM Association and UMTS Forum). This shows the range and flexibility of cooperation possible and already practiced.

Standardisation therefore offers an open consensus building forum for pre-competitive R&D and thus also provides a 'load sharing' mechanism for the development of technology in addition to the actual writing of the standards.

ETSI is currently undertaking a review of its future role, and giving careful consideration to how it can best respond to the 'internet challenge', and work with global partners and streamline (speed up) its standardisation process. One recommendation which is currently for further study is the possibility

of ETSI facilitating the creation of closed special interest groups, which create their own rules.

ETSI is interested to improve working with the defence community.

Requirements Capture in ETSI

ETSI operates a contribution driven culture. Technical meetings are open to full and associate members and others by arrangement. Where these arrangements prove inadequate for the target market, a partnership (such as the 3GPP) may be established external to ETSI.

Standard development in ETSI undergoes a 'requirement capture' phase' and often there is a sub-committee (or working group) dedicated to this process. For example in the Technical Committee (TC) SMG (Special Mobile Group), sub-technical committee 1 (SMG1) is responsible for specifying service requirements, which are then developed by the remaining sub-technical committees. In ETSI Project (EP) TETRA, working group (WG) 1 is responsible for requirements capture, and the requirements are then translated into standards by the remaining working groups within EP TETRA.

The emerging ETSI DIIS (Digital Interchange of Information and Signaling) standard is targeted at small communities of users (taxi firms, private security guards, retail outlets, etc.) who collectively do not have the resources (or expertise) to attend standards meetings. In this case the manufacturers need to do extensive market research to capture the user requirements (note that market research is closely related to requirements capture). The manufacturers are using an 'integrated product research process' in the standards forum.

The opportunities to enter requirements into ETSI standards are therefore:

- Direct participation in the technical meetings.
- Representations to participating manufacturers.

The effectiveness of the contributions are based on:

- The associated business case (cost of implementation versus increased market size).
- Technical merit.
- Being present and making the case.

The military have a broad range of requirements, many of these map readily onto existing civil market requirements (sometimes they may differ only in the terminology used). Some defence requirements may only have a minor (if any) cost

impact, or actually improve the civil market opportunities. For Example, the workshop discussed the civil requirement for priority and preemption: the military view that there was not a civil requirement was countered by the civil view that there was, and that some ETSI standards already incorporate these features (e.g. TETRA and GSM-R).

Technical committees in standards fora often have difficulty receiving direct input from users, and user representatives may therefore make a valuable and welcome contribution.

Advantages

The advantages for the defence community of working closely with civil standards are manifold. Standards are already seen and accepted as an important component to achieve interoperability. They facilitate interworking and interoperability between current, future and legacy systems (standards tend to evolve more slowly than technology). They facilitate interoperability between different vendors equipment, increasing the freedom for competitive initial procurement and competitive mid-life upgrade. They facilitate interoperability between different nations in coalition operations. Standards provide economy of scale (through cooperation) in the development of new technology. Standards give consumers increased confidence to invest in new technology, thereby encouraging market development. Standards are the essence of communication systems (in that communication systems must interoperate in order to communicate!)

Standards fora offer a ready made environment for consensus building. They provide the involvement of industry for free (and access to key people within companies who might otherwise be difficult to get hold of). They provide a place to expose, discuss and trade off and refine requirements, in cooperation with and with inputs from industry - in the spirit of recent approaches to 'smart procurement'.

COTS equipment which has been developed in conformance to standards which have successfully captured or (more realistically which have partially captured) defence requirements will more likely be a cost effective solution than if those standards are developed without any input from the defence community.

Being present in and aware of developments in standards fora additionally gives advance knowledge of new developments, typically 1-2

years in front of the appearance in the market of products. It also gives insight into the technical capability, technical options and technical limitations of the developing technology.

Standards are only a part of technology development and may offer many implementation options. Defence use of equipment built to a particular standard may be facilitated by simply specifying a recommended option profile (i.e. which set of options best serve the defence application). The ability to do this requires familiarity with the standards and the likely stance by the various manufacturers on each option. Good judgement will be facilitated by being present when the standards requirements were discussed and the options presented for inclusion.

Many organisations participate in standards for credibility - to be present when the standards are formulated - 'table stakes'.

NATO and Standards

NATO has for many years recognised the importance of standards, and the necessity to use existing standards wherever possible and it works towards this end within the NATO C3 Organisation (through the various sub-committees) through the production of 'standards agreements' - STANAGs.

In areas where existing standards are not sufficient the nations may work together to create new standards, within the NC3O. The alternative is to accept proprietary technology.

Whereas NATO policy with respect to existing standards is clearly defined, the action with respect to standards which only partly meet requirements is not clearly defined and the methods of dealing with the associated 'requirements gap'.

Challenges

Drawing together for mutual advantage the standards creating activities of NATO and standards developing organisations (for example ETSI) presents several challenges.

The language, culture and processes of NATO standardisation may appear quite different from the language, culture and processes of civil standards fora, such as ETSI. The technical experts and operational requirements community in NATO may not be familiar with the working procedures and methods of ETSI.

The members of civil standards bodies are not in general familiar with the defence market requirements, decision making or procurement

processes. Even where a manufacturing company has interests in both civil and military markets, often there is a dividing line between these two communities within the company.

The first challenge is to build a bridge between these two communities. To relate the commercial 'business process' to the military business process ('doctrine'), the commercial 'market research' and 'market requirements' terminology to the military 'operational requirements' and 'user requirements'. The challenge is to overcome the 'natural resistance' to commercial technology which exists in the military community, to separate out those technical areas where differences of approach are not reconcilable and to work together in all the other areas. The military always see an enemy, and therefore will never willingly expose a weakness. This concern must be addressed for the defence community to work effectively in civil standards fora. The challenge is to separate the parts of a defence requirement which have security sensitivity, from those which do not.

The challenge which exists in both civil and military communities is the reluctance to own (provide resources to support) the participation (effort) in activity related to standards, since this participation makes no *immediate* contribution to profit (or operational capability) and consumes resources. The value of the activity may only be realised in the long term, and is difficult to quantify in general. This is exacerbated when the outcome of a democratic consensus building process (which standards development inevitably is) may not meet 100% of the requirements of one organisation.

It is important to recognize that because defence markets are relatively small in numbers terms, the ability to guarantee success in having requirements adopted does not exist. This often gets translated into an objection to any involvement in the civil standards process, therefore denying all of the benefits because 100% success cannot be guaranteed. The challenge is to determine a balanced approach - measuring resources against realistic outcome. Standards are created for many user groups which may be individually small (for example the DIIS standards described above). Many companies participate which are small. No single organisation (user, or manufacturer) can reasonably expect to achieve 100% of its objectives in a consensus building forum, but this does not prevent them participating.

The challenge is to maximise the effective coordination within the defence community, in

order to increase the chance of success. This implies agreement within the defence community on at least some requirements, followed by coordinated working within the chosen standards body.

Potential Areas for Collaboration

This section identifies possible areas for future closer working between civil standards bodies and the defence community within NATO. Some areas are clear opportunities to develop or 'fine tune' existing standards, some areas are more closely related to research activity and the scientific programme of work.

Strategic Tactical Interoperability

The development of the standards agreement for the Digital Strategic Tactical Gateway (DTSG) which is essentially an interface specification between ISDN and tactical networks (which may include STANAG5040 or STANAG 4206 gateways) may result in requirements for small enhancements to the ISDN standards. The DSTG (STANAG 4578) could be developed inside the framework provided by (for example) ETSI, alongside 'change requests' to ISDN specifications.

Advanced Network Architecture

ETSI has a number of projects which are addressing and developing advanced network architectures as part of new standardisation activities. For example the 3rd Generation Partnership Project (3GPP) is necessarily addressing the evolution of the core network technology (currently ISDN based), taking into account (for example) internet (IP), mobile internet (MobileIP), and ATM. ETSI Project TIPHON focuses on voice communication and related multimedia aspects as required to enable interoperability within IP based networks and with other types of networks. ETSI Project BRAN deals with broadband radio access networks.

Personal Communication Services (PCS)

ETSI is responsible for the GSM standard, is a partner in 3rd Generation standards (3GPP) development, is responsible for TETRA (which is being considered by many nations for various military applications.) Aspects of TETRA implementation may still be open for standardisation work, particularly in the area of security. The proposed broadband successor to TETRA is in the very early stages of development (DAWS) and therefore now open to users requirements input.

Summary

Telecommunications is developing at a fast pace, particularly in the civil domain.

Defence users increasingly make use of civil standards and equipment procured to civil standards and therefore are 'stakeholders' in those standards.

The resources available to the defence community to invest in proprietary solutions in order to fill the 'requirements gap' are diminishing.


Coordination within the defence community with respect to working with standards will result in efficiency gains and increased effectiveness.

Standards organisations provide a consensus building forum with industry.

Conclusions

NATO and the NATO nations should give due consideration to areas of technical work which may be effectively progressed in cooperation with, or within civil standards bodies such as ETSI, and reduce to a minimum the 'proprietary standardisation' activity which currently occurs.

A coordination activity should be started within NATO to facilitate and encourage defence participation in civil standard bodies.




The Coordinated Defence Role in Civil (Telecom) Standardisation

Dr Paul Thorlby

*The "Ruthless Pursuit of COTS" IST Panel Symposium
April 2000*


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Presentation Structure

- Background
- NATO C3 Agency Workshop and ETSI
- ETSI
- Requirements capture in the SDO context
- Advantages
- Challenges
- Potential opportunities
- Summary & Recommendations


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Background

- Standards promote
 - Interoperability - horizontal and vertical
 - Market development
 - Competition
- Military users use COTS built to civil standards
 - Increasing trend especially in telecom and IS
- Defence community therefore:
 - Is a stakeholder in civil standards
 - Has an interest in standards development process
 - Has an interest to input requirements to standards process


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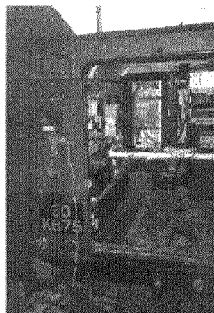
Deployed Mobile Communications



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Deployable COTS Mobile Access



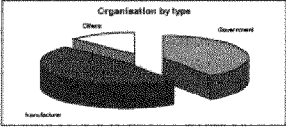
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Defence Markets for Telecom Standards and Technologies

- Workshop at ETSI on 29th November 1999
 - <http://www.nc3a.nato.int/news.htm>
- Representative - 32 organisations (government, manufacturer...)



Organisation by type

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Workshop Participation

- Representative - 55 delegates from 12 nations:

Organisations by Country

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Workshop Addressed

- How can **ETSI** capture defence requirements effectively?
- How can **NATO** understand and relate to ETSI processes?
- How can **industry** relate defence requirements to civil requirements?
- How can **Defence community** be facilitated to work in civil standards?

By

Assembling representatives from all communities
Encouraging free discussion around structured presentations

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ETSI

- A regional telecom standards developing organisation (Europe)
 - Produces standards which are used globally (e.g. GSM)
 - 730 member organisations from 50 countries (51% manufacturers)
- ETSI is
 - Open (standards are freely available at <http://www.etsi.org>)
 - Market driven
 - Pre-competitive cooperation
 - Forum for building consensus
 - Consensus = 'Lack of sustained opposition'
 - Prepared to partner and cooperate with many organisations/forums
 - e.g. IETF, UMTS, GSM, WAP, IPv6, ATM Forum, 3GPP (<http://www.3gpp.org>)

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Requirements Capture in ETSI

- Contribution driven
 - Technical meetings are open to all members (and others by arrangement)
 - Often there is a sub-committee/WG devoted to 'requirements capture'
 - e.g. SMG1 (for GSM), EP-TETRA/WG1 (for TETRA)
- Enter requirements:
 - Direct participation in technical body
 - Work through manufacturers who participate directly
- Effectiveness depends on:
 - Being present to make the case
 - Technical merit
 - Perceived market requirement (business case)

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Advantages

- Standards Body provides
 - Ready made forum for consensus building
 - 'Free' industry participation
 - Opportunity to trade off and refine requirements in COTS context
- Future COTS equipment
 - Better fit to defence requirements
- Better informed
 - Opportunity to see what civil technology is coming...
 - Insight into parts of a standard which may be implemented
 - Identify 'interoperability loopholes'
- Credibility

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Challenges

- Overcome
 - Cultural and language differences between civil and military communities
 - Ignorance in both communities of the other's processes and priorities
 - Differences in timescales and procurement methods
 - Reluctance to 'own participation in standards development'
- Relate
 - 'Business process' to 'Doctrine'
 - 'Market research' to '(operational) requirements capture'
- Separate
 - Security sensitive aspects from non sensitive aspects

Coordinate defence participation within the Alliance!


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Potential Opportunities

- Digital Strategic Tactical Gateway (DSTG) STANAG 4578
 - Produce within civil SDO?
 - Propose enhancements to ISDN?
- Advanced network architectures (NGCS evolution)
 - Conduct technology assessment/research in context of
 - 3G, (ATM and IP) developments?
- PCS (Personal Communication Services)
 - Adopt/adapt for military - enhance security for end users?
 - GSM, TETRA (and APCO35), DAWS (and APCO34)...?


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Summary

- Civil telecom technology is *developing very quickly*
- Defence users increasingly use COTS and therefore become *stakeholders*
- Proprietary solutions for the '*requirements gap*' are expensive
- A Standards body is a ready made *consensus building forum with industry*

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Recommendations

- NATO and Nations determine opportunities to progress technical activities within civil standards organisations (consider this a new mode of working)
- NATO provides a forum for coordinating such activity where appropriate

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