

Final report for DCITA

Assessment of text any-to-any connectivity options

Future directions for text
communications

0 Executive summary

Textphones are communications terminals that are used for a text telephony service, thus allowing users, who may be Deaf, hearing impaired or speech impaired, to have a text-based conversation with another textphone user.

There is no single universal standard for textphones, and thus over the years different – and incompatible – standards have been implemented in different countries. For example, in Australia textphones (TTYs) use the Baudot 50 protocol, in the United States the Baudot 45 protocol is used, while in Europe there are at least six different textphone protocols in use.

The Baudot protocol is the original standard used by the first TTYs in the 1960s. Key characteristics of Baudot TTYs include:

- half duplex mode – only one party can transmit at a time and must wait for the ‘GA’ symbol, meaning ‘go ahead’ before responding (to avoid lost or jumbled characters)
- limited character set – only capital letters and numbers
- transmission of up to around six characters per second, which causes problems for fast typists.

More modern (‘next generation’) textphones based on ITU-T data transmission standards (V.18 and V.21) differ from Baudot TTYs in that they can:

- operate in full duplex mode – both parties can transmit at the same time, enabling the call to be more like a real-time conversation
- support a wider range of characters
- transmit up to 30 characters per second.

Other advances in text communications, such as CTM and Text over IP (ToIP), seek to develop standards for real-time text communication over mobile networks or next generation IP-based networks.

The uptake of next generation textphones and other developments in text communications will be limited if there is no means of intercommunication with existing TTY users. In 2004, the ACIF Any-to-Any Connectivity Options Working Group (TATA WG) proposed a 'text server' solution to enable seamless connectivity between textphones and digital terminal equipment¹. This solution involves a device designed to sit within a telecommunications network (or other suitable location) and provide a 'gateway' service that would enable connectivity between different text devices on all fixed, mobile and IP-based networks.

The objective of this study is to examine the technical feasibility and financial viability of the Stage 1 ACIF text server proposal. This provides for real-time text communication services between the following:

- existing Baudot TTYs on fixed PSTN lines
- V.18-mode textphones on fixed PSTN lines
- V.21 textphones on fixed PSTN lines
- cellular text modem (CTM) textphones over GSM, CDMA and 3G mobile networks
- mobile phone terminals using the circuit switched data channel (such as PDAs and notebook computers).

We found that while the ACIF text server proposal will certainly meet these technical requirements, it would be more cost effective to implement a commercially available solution rather than to develop a solution specifically for the Australian market.

We have identified three vendors with products that appear to address the ACIF text server Stage 1 requirements: DSPG, Netwise and NXi Communications. Products of all three vendors have functionality beyond that of the Stage 1 ACIF text server specification, encompassing parts of Stage 2 of the ACIF text server (which expands textphone interoperability capabilities to include SMS, MMS, email, instant messaging and possibly Text over IP) and other features, including relay services.

It should be noted that the architecture of the Stage 1 text server requires continued support of transport for Baudot TTY protocols across wide area networks to reach a centralised server location. This means that:

1

ACIF (2004) *Text sever business model*, August 2004.

- the useful life of a Stage 1 server may be limited beyond 2010 by commercially driven next generation network (NGN) and VoIP rollout in Australia, or
- widespread network intelligence and additional resources (capacity) may need to be built in to NGN plans to support a small and diminishing number of TTY terminals.

Core principles for a text gateway service

We believe that any solution for providing text gateway services needs to comply with certain core principles:

- be a cost-effective solution for the provision of text telephony services
- have features and functionality that address user requirements, and that improve over time rather than remaining static
- be easy to use
- where possible, utilise mainstream products and services offered by carriers
- be compatible with technology and network developments for at least the short to medium term (two to five years)
- use international standards if possible
- have vendor support.

Cost-effective solution

In addition to identifying a competitive and low cost implementation strategy for the ACIF text server hardware, a cost-effective solution must address:

- whole of life costs of the server which are influenced by ongoing maintenance, development and hosting costs
- cost saving opportunities through co-location and co-hosting of related applications (such as Internet relay) on the server infrastructure
- network capital and call related costs which arise through choice of network interfaces and server location.

Note that many services for disabled persons are not offered on a commercial basis, but are subject to various carrier obligations, such as those that apply to the universal service provider under the *Telecommunications (Consumer Protection and Service Standards) Act 1999*, or those specified under the *Disability Discrimination Act 1992*.

Features and functionality that meet user requirements

The features provided by a text gateway or server need to match those that potential users would require. The key questions that need to be addressed are:

- what functionality do users seek?
- is this functionality provided in a mainstream product or service?

With a small market for text telephony services, and limited resources to implement solutions, it is imperative that solutions are developed that are fit-for-purpose, and meet the needs of the user community, otherwise that community may be discouraged from using text telephony services.

Ease of use

The implementation of a text gateway or server needs to ensure that the process of making and receiving text-based calls is as easy and seamless as possible. Users will become impatient with a service that is perceived to be cumbersome to use. Complicated or lengthy access codes or unreasonable delays will be barriers for many users, who would then seek alternative forms of communication, or simply just go without, thereby becoming further isolated.

Utilise mainstream products and services

This point is closely related to the issues of providing the most cost-effective solution and ensuring ongoing support for text services. The stranding of TTY technology, and subsequently TTY users, by changes occurring in mainstream telecommunications technology should be avoided in future text service development. The key issues are the extent to which modern technology can be made to provide TTY functionality in a cost effective manner and the rate at which TTY and conventional textphone users are adopting mainstream Internet, IP and mobile based text services. Developments such as ToIP aim to merge the textphone and IP text service capabilities in a mainstream form available and useful to all network users.

Compatibility with technology and network

Baudot TTYs were designed to work with low speed analogue fixed line voice networks. They currently cannot be used with Telstra's CDMA wireless local loop (WLL) system (Telstra is developing a

developments

solution that addresses this issue). There is a limited ability for use over the CDMA and GSM mobile networks within Australia, however this depends upon the TTY and the mobile handset combination. There are also difficulties in using Baudot TTYs with some Voice over IP (VoIP) systems. All of these technologies use various types of voice compression – enabling more effective use of telecommunications network capacity – that distort the Baudot signals used by Australian TTYs for transmitting text conversations.

Companies or organisations that have shifted to VoIP systems for telecommunications are finding that TTYs may not work when connected to the new system. If apartment blocks or residential developments are wired for broadband, with the expectation that residents will use VoIP for telephony, again TTYs may not operate. In these instances, it would be necessary to install an analogue or special technology line for TTY use, which will result in additional upfront and ongoing expense for the organisation or resident.

While the objective of the text server was to overcome equipment compatibility issues, there is a wider problem concerning the ability of calls to and from Baudot TTYs to be transported over the network. Telephone networks are increasingly becoming based on IP technology, and the ability of operators to continue to support TTY traffic will depend upon whether equipment vendors consider it worthwhile to retain this functionality. Furthermore, Telstra's policy of using only off-the-shelf products means that customisation by Telstra of existing solutions is unlikely to occur.

Telstra's Next Generation Network plans are such that the PSTN will be IP-based within two to three years. There may still be a copper or broadband line from the node to the user's premises, but there is no guarantee that the line will be able to transport TTY traffic. Telstra notes that the future of TTYs in Australia is uncertain, and is actively engaging with vendors to ensure that obligations with regard to TTY services can continue to be met, however there is a possibility that Baudot TTYs may not have a future beyond two to three years. As the universal service provider, Telstra has an obligation to provide a

solution offering a standard telephone service equivalent to users with a disability.

Comply with international standards

Compliance with standards is a key cost driver for equipment in all areas of telecommunications. Standards allow vendors to build a single version of their product which can be sold into many international markets. From the customer perspective, standards ensure interoperability of equipment, meaning an ability to communicate with a greater number of users.

There have been a number of developments in textphone protocols. Standards such as H.323 and Session Initiation Protocol (SIP) are VoIP call control protocols which set up calls of varying bandwidth and quality using a range of voice codecs which can (to varying degrees) handle Baudot tones. The V.18 protocol is the most modern textphone standard which also supports a gateway function for interworking between textphones with Baudot 45², Baudot 50, V.21, DTMF and EDT protocols, in the PSTN/ISDN environment.

Vendor support

Key issues for vendors in the modern telecommunications market are:

- influencing standards directions to favour their in-house product development plans
- bringing product to market ahead of their competitors
- achieving low per-unit costs through mass production of equipment
- retaining customer (network operator) loyalty so they continue to buy and upgrade equipment
- bundling support and other operational services with equipment sales to achieve ongoing revenue streams after the capital purchase has been made.

The market for textphone-specific products is unique and very small, compared to markets for other telephone devices. In such a market it is

likely that vendors will fail and/or abandon product which does not quickly take significant market share. It is very important that any implementation of the ACIF text server proposal utilises equipment which already has a proven track record in the international market, and is provided by vendors with significant resources and an ability to service the local Australian market.

Our evaluation of the technical options for a text server was based on these core principles. While the ACIF text server proposal and commercial solutions certainly are consistent with several of these principles – such as complying with international standards, and features that meet the specified functional requirements – the key advantages of the commercial solutions were that they were more cost-effective, have vendor support, and a clear development path for future trends in technologies and networks.

The text server and user demand

Once the text server has been implemented, it will still be possible for users to make direct calls (that is, not via the gateway) to other textphone users if the two textphones are compatible. To make a call via the text server a user must enter a short number prefix (such as 119) immediately prior to dialling the number they wish to call. Also note that the user will need to dial the full phone number including the STD area code, even if the equivalent direct call is local.

We believe that users will overwhelmingly prefer to make direct calls, mainly to avoid the inconvenience of dialling the extra digits of the access prefix and the STD area code, but also to avoid the increased delay in call connection that will occur with calls via the text server. The length of the delay will be dependent upon the textphone protocols used by the caller and the called party, plus the time required to place the call from the text server to the called party.

Users will recognise that there is no need to make calls via the text server unless they wish to contact a user with an incompatible textphone, or if they do not know in advance what type of textphone or telecommunications device is being used by the person to be called. Therefore, there will be a direct relationship between the traffic volumes via the text server and the size of the user base for next generation textphones.