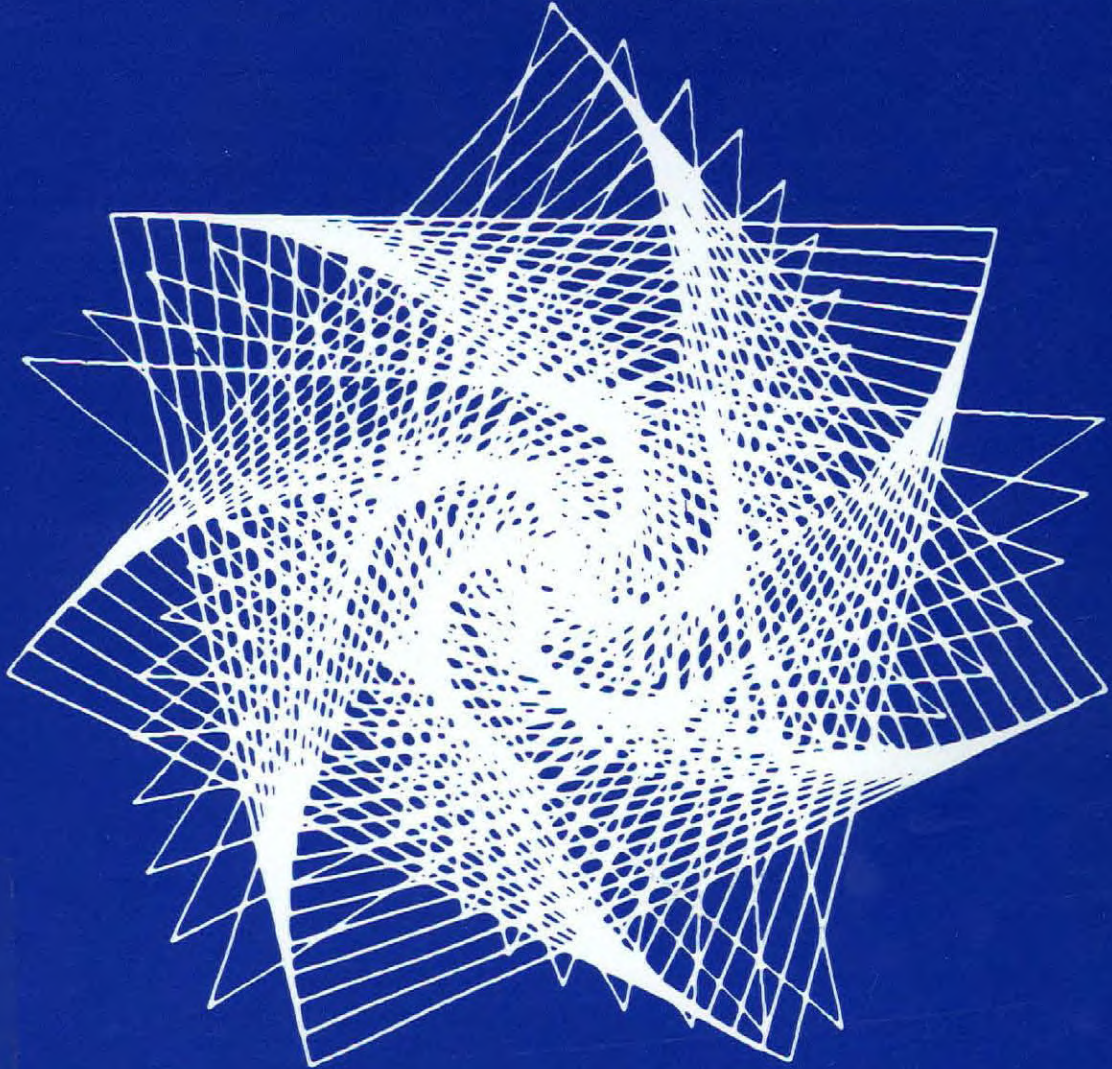A STUDY FOR THE
DEPARTMENT OF COMMUNICATIONS (DOC)
NEW TELETEXT SERVICES: REPORT #1
THE APPLICATIONS, THEIR ANALYSIS,
AND DERIVED TECHNICAL REQUIREMENTS

orpak corporation

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NORPAK Corporation

A Study

For The

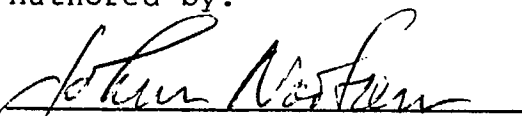Department of Communications (DOC)

New Teletext Services (NTS): Report #1

The Applications, Their Analysis,
and
Derived Technical Requirements

Submitted In Partial Fulfillment Of Contract

DSS File # 1ER.36001-4-1979

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T A B L E   O F   C O N T E N T S

L I S T   O F   F I G U R E S

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1. EXECUTIVE SUMMARY

The purpose of this document is to table and examine a set of
NABTS compatible teletext-based applications that may require
extension to the existing standards and technology beyond that
which is possible within the current framework of NABTS, and for
which we derive the principal technical requirements to meet
those applications.

Our approach has been to take the most commercially significant
applications for examination of the basic cost-value
relationship, economic viability, and thence proceed to provide a
"best guess" system decomposition to define the technical
requirements of the system and its components. From these
individual technical requirements, a synthesis is made into major
groupings.

The applications under consideration for new teletext services
include:

*   business information delivery (Section 3.) whose scope
        includes the timely supply of financial, stock market,
        product information, specialty news stories, etc. in
        electronic form to a variety of end-user output devices;

*   business data delivery (Section 4.) providing uni-
        directional point to multi-point digital data delivery for
        corporations requiring inexpensive communication on a
        continental distribution scale;

*   consumer catalogue shopping (Section 5.), which provides the
        consumer with the ability to peruse an electronic catalogue,
        perform comparative shopping, look at quality pictures for
        many items, and transact a purchase;

*   electronic software publishing (Section 6.) including the
        marketing, sales, delivery and support (publishing) of
        software that the customer may keep, rent or in some cases
        have free and unlimited access to use; and

*   consumer television viewer service enhancement (Section 7.),
        addressing those services that affect the viewer including,
        tiered or pay per show viewing, utility load shedding, home
        security (not likely), personal messaging (including voice),
        synthetic sound (voice and musical sounds).

Four other applications are addressed in summary form. Either
their technical requirements overlap with those of the
aforementioned applications, the commercial scope of the
application is relatively small, or the application is no longer
commercially viable. These applications (addressed in Section
8.) include:

*   television operations enhancement addressing those services
        or functions that affect the operator including audience
        research (eg Nielsen, BBM), verification of advertising,
        television program source identification, remote control of
        television plant, replacement of current data services (for
        internal use);

*   consumer teletext for Asiatic markets including the near and
        far east, while not in principle a new teletext service does
        pose certain technical problems associated with the
        television standards and text fonts indigenous to the
        country;

*   education and training with special emphasis on interface to
        assorted conventional consumer and commercial audio and
        visual devices, use of public domain software; and

*   quality sound (music) publishing, which is a potential
        service addressing the delivery of digital sound products to
        the consumer via teletext.

The principal technical requirements derived for new teletext
services fall into the following categories which are not
necessarily independent:

*   error protection mechanisms to ensure that the required
        level of data service or product integrity is available to
        the end-user;

*   service provider/operator control of terminal for service
        access and data product usage;

*   optimal channel usage in consideration of meeting other
        function and performance needs;

*   optimal terminal design reflecting the compromise between
        function, performance and cost (capital and operating);

*   return communication for transaction purposes;

*   new system feature upward compatibility to ensure graceful
        introduction of new services without the disruption (in its
        full generality) of those already existing; and

*   miscellaneous requirements that are principally related to
        presentation layer functionality, or those which are
        relatively exotic or of potentially low level of usage as
        to be best relegated to application layer functionality.

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2. INTRODUCTION

2.1. Background

NORPAK's business is teletext. As a result, some of the
Corporation's customers make requests for system components to be
used in the implementation of teletext services that require
communication capability in excess of that specified by NABTS.

2.2. Purpose: The Complete Study

NORPAK Corporation has been contracted to perform a study for the
Department of Communications for the purpose of examining new
teletext-based services, and to ultimately make specific
recommendations for any extensions that may be required of NABTS.
The only recommendations will be those that can be shown to
manisfestly be essential to either the functionality or the
performance or both of the service.

The complete study and recommendations will be contained in four
documents which address the following topics (grouped according
to document):

*   analysis of applications and derivation of technical
        requirements;

*   analysis of technical requirements and recommended design
        approaches with particular emphasis on their implications
        with respect to NABTS and possible extensions to the basic
        specification;

*   specific recommendations for extension to the current NABTS
        definition; and

*   an examination of the possible approaches to the
        implementation of the new services, with special emphasis on
        the enhancements to the teletext sourcing and delivery
        plant.

2.3. Purpose: This Document

This document represents the first component of an overall study
to address the analysis of several new teletext service
applications, and for which it is possible that extensions will
be--required to the current NABTS definition in support of these
applications.

The applications are defined and analysed to distill the
essential technical requirements necessary for the new services,
and a clear statement is made of these technical requirements.

2.4. General Assumptions

The general and in some cases implicit assumptions made for the purpose of this study include:

*   that the new services are teletext based in a practical way, and are built upon the existing broadcast and cable television infra-structure;

*   that the services are compatible with the current NABTS specification (ie. systems based on the current specification will not be rendered non-functional with new service extensions);

*   the assessment of the relevance of the technical requirements will be based on the application's commercial opportunity and viability rather than on the technical aesthetics or possibilities of their own right; and

*   that there will be no encumbering or restrictive regulatory legislation to affect these services.

2.5. Approach

The approach to be used for this component of the study will be:

*   to identify the applications based on commercial viability and technological reality, ie. that the items considered are those that have a reasonable possibility of being implemented typically within the next 2 to 4 years, using technology that is available today, and to ensure that the definition of the applications forms an "orthogonal" (independent of each other to the greatest extent possible) set so that the derived set of technical requirements of any one application are independent of those for another;

*   to ensure that the application and its requirements, as seen by the "primary" users, its economic viability, and its implementation staging, are the principal factors that determine technical requirements, together with an approximate level of compliance for the requirements such that application viability is still retained;

*   to consolidate the technical requirements from all applications through suitable grouping, exposing gross similarities and differences within each group, and to regroup these if necessary to provide a largely "orthogonal" (ie. independent from each other) set of grouped requirements; and

*   to prioritize the requirements within each group, clearly identifying those that do not merit support, and to make a clear statement of the requirements that must be addressed

for the design consideration component of the overall study.

2.6. Basis of Study Report

The applications selected for analysis in this study report
are representative of the requests that NORPAK Corporation
receives directly from its customers together with information
about potential indirect business opportunities.

While the discussion of the applications do not convey the exact
details of any one particular situation, they do embody the
essential features required to perform a technical analysis.

2.7. Technical Requirements Model

Each application is described and examined against a hierchical
structured template of the criteria both qualitative and, where
possible, quantitative.

To provide a framework by which the technical requirements may be
defined, we employ a "best guess" generic system model which is
configured with the principal expected building blocks. This
generic set of building blocks will be used throughout this study
for each of the application technical requirement definitions.

First the technical requirements of the application system as a
whole is considered, followed by those for each of the major
generic functional building blocks (refer to Figure 2-1) which
include:

*   an <u>application source system</u> on which all service data is
     collected and prepared;

*   a <u>teletext gateway system</u> which takes one or more
     application source system outputs (may be several
     independent sources) and "packages" the data for eventual
     delivery by teletext;

*   a <u>gateway to television link</u> which transport the data to
     the point of insertion on the television network;

*   a <u>television-teletext system</u> distribution network consisting
     of the existing television plant together with any necessary
     teletext-handling subsystems;

*   an <u>end-user terminal system</u> consisting of a receiver
   .- adapter and one of a printer, VDT or personal computer
     device;

*   a <u>return transaction link</u> consisting of all components to
     sign-up and pay for the desired services.

The systems used to fulfill each application can generally be

segmented so as to "fit" into this model.

2.8. Overview

In the following sections of this document we will present the analysis of nine applications the first five of which are addressed in some relative detail in each of Sections 3. through Section 7., and the last four which are addressed briefly in Section 8.

In the final section (Section 9.), a consolidation of the technical requirements for new teletext services is made. Key to this endeavour is the organization of disparate requirements into meaningful and hopefully independent sets. The recommended list of requirements will become the basis for the next portion of this study, which is to consider their technical and design ramifications.

2.8.1. Applications For Consideration

The list of applications for analysis for new teletext services includes:

*   business information delivery (Section 3.) whose scope
        includes the timely supply of financial, stock market,
        product information, specialty news stories, etc. in
        electronic form to a variety of end-user output devices;

*   business data delivery (Section 4.) providing uni-
        directional point to multi-point digital data delivery for
        corporations requiring inexpensive communication on a
        continental distribution scale;

*   consumer catalogue shopping (Section 5.), which provides the
        consumer with the ability to peruse an electronic catalogue,
        perform comparative shopping, look at quality pictures for
        many items, and transact a purchase;

*   electronic software publishing (Section 6.) including the
        marketing, sales, delivery and support (publishing) of
        software that the customer may keep, rent or in some cases
        have free and unlimited access to use; and

*   consumer television viewer service enhancement (Section 7.),
        addressing those services that affect the viewer including,
        tiered or pay per show viewing, utility load shedding, home
   --   security (not likely), personal messaging (including voice),
        synthetic sound (voice and musical sounds);

Four other applications that are addressed are somewhat special, and will be given brief attention only. They include:

*   television operations enhancement addressing those services

or functions that affect the operator including audience research (eg Nielsen, BBM), verification of advertising, television program source identification, remote control of television plant, replacement of current data services (for internal use);

*   <u>consumer</u> <u>teletext</u> <u>for</u> <u>Asiatic</u> <u>markets</u> including the near and far east, while not in principle a new teletext service does poses certain technical problems associated with the television standards and text fonts indigenous to the country;

*   <u>education</u> <u>and</u> <u>training</u> with special emphasis on interface to assorted conventional consumer and commercial audio and visual devices, use of public domain software; and

*   <u>quality</u> <u>sound</u> <u>(music)</u> <u>publishing</u>, which is a potential service addressing the delivery of digital sound products to the consumer via teletext.

The commercial scope of television operations enhancement is relatively small compared to all others.

Although consumer teletext for Asiatic countries is similar to the "classical" North American consumer service, it does pose special problems best addressed in the Presentation Level Protocol (PLP). Strictly speaking, the issue should not be addressed within the scope of this overall study, but is included because of its potential commercial impact.

Quality sound (music) product delivery is no longer commercially viable.

2.8.2. Technical Requirements

To provide an appreciation for the distinction between the applications and their derived technical requirements, a brief review of some anticipated technical requirements is made. The candidate list of the most significant requirements includes:

*   simultaneous multi-service access, together with the prioritization control by the user terminal;

*   transaction capability including reverse communication over telco and cable, identification and authentication, support of both traditional and "smart" cards;

*   control of access to and security of service with mechanisms such as encryption;

*   terminal classification, addressing, identification, tier structuring, and soft loading of NABTS service filters;

*   cache storage;

*   transparency of NABTS link (for certain types of services, support of both 7 and 8 bit data formats, and the control of data delivery latency and peak-to-mean received load ratio (ie., continuity in time);

*   error protection and recovery, together with consideration of selectable quality of the corrected error rate,

and to a lesser (perhaps more esoteric) extent:

*   provision of sound enhancement including synthesized voice and music, and then synchronization with the visual message;

*   accommodation of universal software languages and local processing.

Figure 2-1: GENERIC TELETEXT SYSTEM MODEL
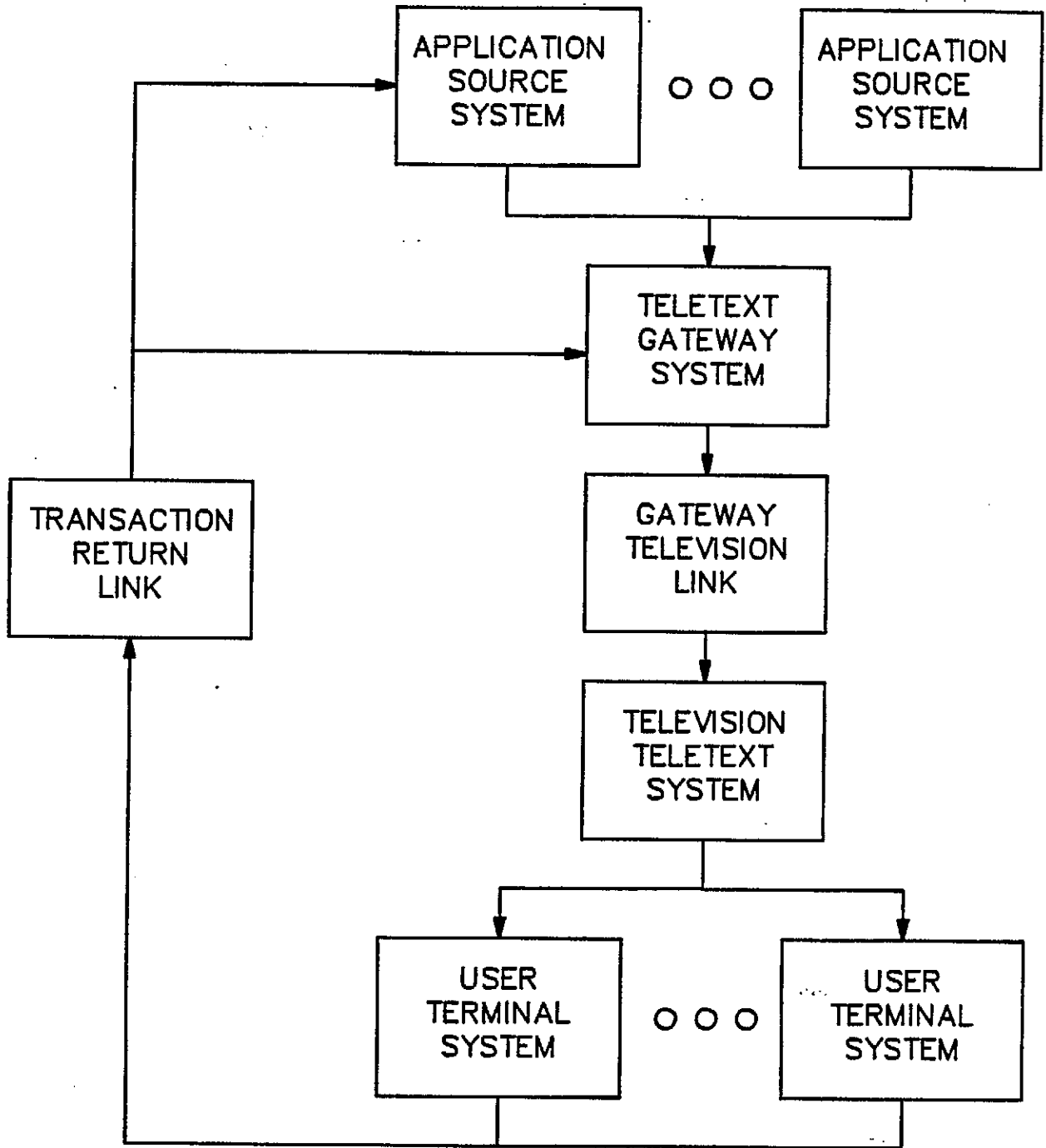
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3. BUSINESS INFORMATION SERVICES

3.1. The Application

By the term BUSINESS INFORMATION SERVICES we mean the process whereby information of a business oriented nature is sold to end users who will use that information to further their own business interests.

3.1.1. Problem & Opportunity

Business organizations continuously seek to improve their productivity and to reduce costs in order to either become or remain competitive. Intrinsic to the operation of most businesses is the ability to retrieve time volatile information data both quickly and cost effectively.

The national television broadcast network, satellite television signal distribution, and urban cable distribution plants have an intrinsic, long available and neglected spare channel communication capacity . This infrastructure is available for point-to-multi-point data distribution use with a relatively low cost increment. In summary, the opportunity that presents itself is:

*   the unused tv channel capacity (VBI and FCI);

*   the exploitation of the imminently available consumer teletext technology and distribution plant; and

*   the acceptance by business people of better services at lower cost through a quantitative appreciation of their value.

3.1.2. Alternatives

Some of the current approaches to providing business information services include:

*   traditional media such as journals and periodicals, and radio and television programs; and

*   the use of dedicated or packet switched telephone lines and/or satellite communication networks, connected in
    .- somewhat of a star network from the user terminals to the service source concentrator.

New approaches being considered to provide the services include:

*   direct broadcast satellite (DBS) to office tower sites or in some cases to an individual terminal;

*   teletext-based services transporting ASCII, NAPLPS and
     general data forms; and

*   FM subcarrier based services.

3.1.3. Selected Approach

The best promise is offered by teletext based delivery mechanisms
in the following respects:

*   for cost/value, DBS while functionally good, is not cost
     effective for single terminal installations (and still
     requires a receiver/adapter device); broadcast teletext
     provides a signal accessible to all who are able to access
     good quality tv signals without the necessity of special
     installation;

*   the very cost effective teletext technology is virtually
     available today;

*   current telco based, printed and broadcast information
     services are either relatively costly or not timely;

*   even if telco costs were significantly reduced, the scale of
     use would bring about a network congestion for which it was
     not designed;

*   in timing, the technology and market is ready now; and

*   the end-user market should be very receptive of the new
     service delivery concept if all expected functional,
     performance and cost requirements met.

3.1.4. The Model

We now table the basic model for the proposed application in
consideration of the needs, their fulfillment and basic
economics. Every link of the chain must be satisfied to make the
application viable.

The basic assumptions made in considering the traditional and new
alternatives to fulfillment of the requirement include:

*   only commercial applications are addressed, ie. only those
     groups which use the distribution service in a way that
     benefits the organization directly through improvement of
  -- its internal operations (as opposed to the indirect benefit
     of providing teletext services for the consumer);

*   that the television broadcast network will be available for
     commercial business applications and not be significantly
     saturated with consumer related services - a fact that is
     currently true but which may be negated if the channel space

is perceived by the broadcaster to be of more value for
consumer-oriented services (note that although the services
can logically share the channel space available, the issue
is one of channel capacity and therefore of performance);

The primary users of the application will be:

*   business information services publishers such as Dow Jones,
     Merrill Lynch, Financial News Network to name a few, who
     will pay a system operator to take their information
     (services) and to distribute them in a timely way across the
     continent, and will look for administrative services to be
     provided by the operator for collection and control of
     access; they will also be able to access (or retain) markets
     that current mechanisms make impractical; and

*   business information end-users who will be looking for more
     timely bulk business information at a good price, making use
     in some cases, of the recently arrived personal computers
     together with existing data printers and VDT's, and who will
     pay for selectivity and scope of service.

To provide the vehicle by which the primary users will be able to
perform their function, one or more system/service operators will
be involved, and include:

*   those who will arrange for distribution of receiver-
     adapters, signal distribution arrangements, and service
     support;

*   broadcast, satellite and cable operators who will setup
     and operate teletext signal plant(s) and provide VBI or FCI
     signal space;

*   local computer stores will sell receiver-adapter units and
     provide maintenance; and

*   service operators who provide a "teletext gateway" and
     transaction processing services.

The equipment and system component suppliers include:

*   system houses or in-house technical group of the service
     publisher for teletext gateway systems;

*   terminal manufacturers to develop and supply the end-user
     terminals;

*   companies specializing in teletext signal plant equipment
     design and manufacture to develop and supply teletext
     delivery equipments; and

*   the television distribution infrastructure is already in
     place.

The benefit derived for each of the principal groups concerned
includes:

*   information service publishers who will be able to provide
        services with larger market share because of lower total
        cost and therefore lower price to information end-users, and
        to have efficient dissemination of point to multi-point
        information for large number of users;

*   the end-user can obtain comprehensive timely information at
        low cost, be able to monitor several services simultaneously
        or store and view later;

*   the television operators who will sell spare VBI (FCI)
        capacity, be cross-supported in aid of the development of
        teletext services, and be able to distribute the cost of
        teletext plant;

*   service providers who will have new business opportunities
        whereby one system can provide communication service to a
        variety of parties; and

*   the manufacturers for whom this represents a new market
        opportunity with the application of consumer teletext
        technology, and for which there is less pricing sensitivity
        compared to consumer targeted products.

The viability of the approach is embodied in:

*   the value/cost relation (ultimate financial value, both
        direct and indirect, relative to the actual capital and
        operating costs) for which all participants can make or save
        money with relatively little investment; and

*   timing which is appropriate in that the technology and
        personal computer base are ready to accept service NOW.

3.2. User Requirements

There are two primary users of the application, namely the
business information publisher or application source, and the
information end-user. All other groups involved with the system
can justify their existence only if the basic requirements of the
primary users are met.

3.2.1. Application Source

The business information service seller or application source
has requirements of a service delivery mechanism as perceived by
him, and independent of the technology used to provide it. The
principal requirements include:

* distribution to the information service end-user who may have a variety of output devices including hardcopy printers, VDT's, and personal computers on which the service data will appear or be used;

* the ability to generally address and control the user access to service AT ANY and ALL TIMES, but with an access to a given user that may be made only sometime within a given day;

* to distribute data to a receiver-adapter population in the order of millions;

* be assured of data integrity as received and used by the end-user;

* in the case of teletext-based delivery, to be assured that users can access the data service on any of the television frequencies including VHF,UHF, and cable;

* to initially provide ASCII based services, with NAPLPS introduced on a gradual basis at a later time;

* to provide service data on a non-cyclic stream basis with perhaps a small component of the service being cyclic;

* the end to end data links for non-cyclic (as seen by user) services should be relatively transparent (up to level 4 of NABTS)

* cost of data transport must be significantly reduced (at least 50%) compared to current approaches;

* the interface to service transport mechanism should be easily made and used; and

* a service billing, payment and management administration mechanism must also be provided.

3.2.2. Application End-User

For the business information (or application) end-user there are some general requirements that must be met for the service to be useful (from his point of view):

* an ability to sign-up for and select one or more of the available services;

* ease of installation and maintenance (must be comparable to typical personal computer equipments);

* personal selection and prioritization of multiple simultaneously accessed services;

Business Information Services

*   improvement in cost, timeliness and quality over current
    techniques;

*   all service data - ASCII, NAPLPS pictorial and general data
    must be capturable for local processing in the cases where
    personal computers are used;

*   useful packaging and presentation of information as provided
    by the information supplier;

*   the ability to interface to some of the services with a
    printer, VDT or, of course, a personal computer.

3.3. Technical Requirements

Understanding the general user needs, we now turn to the
technical aspects of how a system might be configured to provide
a vehicle on which the application will operate.

3.3.1. Total System

The general use of the total system may be described by:

*   information publishers collect, digest, interpret and
    package information for a variety of distribution mechanisms
    of which the subject teletext approach is one;

*   the publisher engages a service operator to provide
    distribution of the information service;

*   the operator has made all arrangements with the television
    signal carriers, and receiver adapter vendors to support the
    data transport mechanism;

*   the end-user using his terminal device interfaced with a
    receiver adapter, can peruse the services available after
    signing up and selecting a service(s);

*   the service sign-up may involve a telephone request
    transaction, after which the service operator "arms" the
    specific receiver adapter to be able to access a given
    service; and

*   the service operator will perform all user service
    administrative functions including payment collection.

Aside from the "final mile" teletext delivery of the service
data, the only other principal system interface is that from the
application information source to the teletext gateway system.
The specifics of its implementation will depend on the particular
system.

Timeliness, guaranteed availability and accuracy of business information is mandatory to be useful. The overall system performance is characterized in these three respects:

*   the <u>received</u> <u>error</u> <u>rate</u>,which must be EXTREMELY low after all passage of the data through all delivery mechanisms, especially the teletext portion, and after all error detection and correction schemes have been applied;

*   the net system <u>throughput</u> <u>capacity</u> must be of the order of 1Ø to 5Ø kbaud (net of delivery envelope), and must not exhibit a data delivery latency of more than several seconds; and

*   <u>availability</u> of service is critical during the normal <u>business</u> <u>hours.</u>

The system is a chain that is only as good as its weakest link, in this case the "last mile" teletext delivery.

We now address each of the the generic system blocks, in a self-similar way with consideration to assumptions, general description, function, inputs (usually identical to outputs of the preceding block), outputs, performance and miscellaneous other factors.

3.3.2. Application Source System

<u>Assumptions:</u> These systems generally already exist, and may need to be modified only slightly to provide output to the teletext gateway system.

<u>General:</u> Mostly standard mainframe and minicomputers with existing information collection and packaging system software. These will be located in several of the largest cities cross the North American continent.

<u>Function:</u> Perform data collection, information extraction, and "packaging" for distribution to various service applications.

<u>Inputs:</u> Physical/electrical - standard communication of convenience such as dedicated private or packet switched telephone lines, local packet networks, LAN etc.; and protocol/function - protocols of convenience, depending on application.

<u>Outputs:</u> Physical/electrical - standard communication of convenience such as dedicated private or packet switched telephone lines, local packet networks, LAN etc.; and protocol/function - protocols of convenience, depending on specifics of the circumstance.

<u>Performance:</u> Capacity/throughput - order of 1 to 1Ø kbaud (service output); error rate - extremely low; and availability -

critical in that one cannot afford service to be down during normal business hours.

Other: Cost is not critical, and is comparable to like equipments in the EDP industry. Support is comparable to EDP industry for like equipments. Expandability is not at issue other than the output should not be flavoured with teletext-delivery-dependent envelopes.

3.3.3. Teletext Gateway System

Assumptions: None that are known at this time.

General: Typically a computer system residing in a city at the focus of several sources requiring teletext transport. Several of these may reside in the largest N.A. cities.

Function: Performs the "splicing" and bundling for teletext delivery of several (many) information services, performs FEC and encryption on services data (where required), organizes receiver/ adapter addressing and control information for distribution; and communicates necessary information for transaction processing via the return transaction link.

Inputs: See Application Source System: Outputs.

Outputs: Physical/electrical - protocol of convenience, typically LAN or other high speed link to the gateway-television link; and protocol/function - NABTS compatible for use by inserter unit at television-teletext system input in non-cyclic and semi-cyclic form.

Performance: Capacity/throughput - typically from 10 to 40 kbaud of useful data at receiver adapter; error rate - extremely low; and availability - critical as cannot afford service to be down during peak business hours.

Other: Cost - not critical; support - comparable to EDP industry for like equipments; and expandability - not an essential issue.

3.3.4. Gateway Television Link

Assumptions: None known at this time.

General: A link used to distribute on a relatively narrow channel across the continent or region, the service data embedded in the teletext envelope to ground stations at each "last mile" node; the most likely link will be satellite narrow (TDMS) and wide (full video) channel to earth stations located at each "last mile" broadcast or cable delivery network. For lower data rates, the broadcast television network is also possible to use. Typically there would one link per teletext gateway system.

Function: To provide primary communication link from teletext gateway system to television-teletext system on a continental, regional or local basis.

Inputs: See Teletext Gateway System: Outputs.

Outputs: Same as Inputs.

Performance: Capacity/throughput - typical 10 to 40 kbaud; error rate - extremely low; and availability - critical.

Other: Cost - not critical for large receiver/adapter population; support - comparable to that for other satellite link applications; and expandability - not an issue.

3.3.5. Television Teletext System

Assumptions: Compatibility with NABTS - built on television signal network (national, regional, local); VBI will be used by broadcasters while FCI (or VBI) will be used by cablecasters for non-broadcast signals; and all teletext signal handling equipments used for traditional consumer teletext are to remain unaltered (in design but not necessarily in configuration.

General: Encoding/insertion electronic equipments are located close television signal at point where final video stream leaves plant for transmitter; and are located at every receive and retransmit point in the distribution chain. These will operate principally on an urban scale. In some instances regional or even continental distribution will be used. These would exist in most N.A. cities of 15,000 or more people.

Function: Non-cyclic insertion stream with limited cyclic stream; forward error protection and data regeneration (databridges); multiple service splicing with controlled allocation of output channel bandwidth to various services (encoders, data bridges and recirculators); in some cases the lowest layer of NABTS is to be used (and still be compatible with the delivery plant); data bridging, encoding, recirculation; temporary caching at nodes where service data are delayed until final delivery is possible.

Inputs: Physical/electrical - see Gateway to Television Link: Outputs; and protocol/function - accept data sets (ASCII, NAPLPS, binary); see also Gateway to Television Link: Outputs.

Outputs: Physical/electrical - either or teletext high speed private leased line (NABTS envelope removed); and protocol/ function - NABTS compatible signal injected in broadcast/cable video stream.

Performance: Capacity/throughput - from one VBI line to FCI capacity; error rate - correction to level that is performed for the distribution of consumer teletext services; and availability

- comparable to broadcast or cable electronic equipments.

Other: Cost - of order $10 to 20K per station/node; comparable
to other broadcast/cable equipments; support - similar to that
for other broadcast/cable equipments; and expandability - must
allow expansion for additional service channels and mix with
local content.

3.3.6. User Terminal System

Assumptions: Not intended to decode NAPLPS; and compatible with
delivery envelope portion of NABTS.

General: User terminal system consists of personal computer,
printer or VDT with receiver adapter.

Function: Can be armed to select from one to several services
simultaneously on priority basis; cache (nominal 64K to 512K) for
data capture without tying up ghosting personal computer (or VDT,
printer); forward error correction and detection (receiving end);
unique terminal identification (used for enabling of user
terminal to receive given service; decryption of protected
services; teletext envelope removal; output ASCII, NAPLPS or
other data forms; and interface to most popular personal
computers, VDT's and printers.

Input: Physical/electrical - video UHF,VHF, Cable frequency; and
protocol/function - contains all required forward error
protection, encryption, and addressing information.

Output: Physical/electrical - serial or computer bus interface;
and protocol/function - unit version to interface to variety of
personal computer's, printers and VDT's (ie., some smart and dumb
devices).

Performance: Capacity/throughput: 1200 to 9600 baud net (after
NABTS, FEC, encryption) per service; error rate - very low after
FEC applied; availability - comparable to personal computer
equipments.

Other: Cost - approximately $300 to $700 acceptable for receiver
adapter depending on features, with rental a possibility, and
installation for a fee of $40; support - typical for personal
computer peripherals; and expandability will accept all potential
NABTS related services (ie. keep special service extensions soft
or in personal computer).

3.3.7. Transaction Return Link

Users will require a backward communication function typically to
request sign-up to selected services for a certain period of
time. Transactions will be based on credit card or other
appropriate identification. Further communication will be

required only if the user terminal system was not successfully armed to receive the service (ie. the service will not be received), or the end-user has not updated his credit for continuance of the service.

In all cases, the frequency of return communication is sufficiently low to warrant only a telephone call using, for example, an 800 number. A service operator will take the calls to update the transaction computer for logging of all transactions and enabling the service for a given user terminal.

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4. BUSINESS DATA DELIVERY

4.1. The Application

The term BUSINESS DATA DELIVERY is applied to those situations
where a business organization is required to distribute data in
electronic form from one or a limited number of points to many
points on a continental or regional basis. The organization
which sources the data is usually its recipient also.

4.1.1. Problem & Opportunity

Business organizations are continually seeking to reduce their
cost of operations. Electronic communication, especially bulk
point to multi-point communication is one such relatively
expensive area. This type of communication is characterized by
unidirectional, bulk data transfers on a relatively infrequent
burst basis, and not generally time critical on a scale less than
hours or even a day.

Examples are not difficult to find. For example a drugstore or
merchandising chain wishes to deliver product description and
price updates to all of its several hundred (thousand)
distributors across the continent. Currently public dial up
networks or leased private or packet switched lines must be used.

The opportunity that presents itself consists of a natural match
between the general requirements and the unused communication
capacity of the broadcast and cable television networks.

4.1.2. Alternatives

Current approaches used in the provision of this type of function
include:

*   the use of dedicated or packet switched telephone lines and
        satellite communication networks; or

*   the physical transfer using transportable medium such as
        computer magnetic tape (or disk) or paper.

Some of the relatively new approaches include:

*   direct broadcast satellite (DBS) channels (for large
    __ organizations with heavy loads to a limited number of down
        link points); or

*   teletext based services.

4.1.3. Selected Approach

We consider the teletext based approach to be optimal for many (if not most) situations for several reasons:

* the cost/value for DBS appears good, but only for a receiving site that has virtually continuous traffic - for a large receiving base the cost of earth stations can be prohibitive at some $5000 per unit;

* the technology available today, although the teletext delivery portion will take about one or two years to put in place (for consumer teletext);

* the user market is ready now to use such a service if available; and

* acceptance of the technique should be good if all functional, performance and cost requirements met.

4.1.4. The Model

This article outlines the basic model of the application in consideration of the user needs, approach to their fulfillment and basic economics. Preliminary indications are that all participants have the opportunity to make or save money with little risk.

The principal users of the application will be a business organization which operates with offices and/or store outlets distributed on a continental or regional scale. The source and the sink of the data be one and the same group or different (eg. in the case of bad credit-card numbers). They will be looking for less costly bulk point to multi-point electronic communication.

However the user organization will require the participation of the following external participants:

* equipment and system component suppliers who will provide teletext gateway systems (system houses or in-house technical group of the principal user), receiver-adapter (companies specializing in teletext signal plant equipment design and manufacture), teletext delivery equipments;

* system integrators who may very well be the principal users; and

* broadcast, satellite and cable operators who will operate the teletext signal delivery plant and provide VBI or FCI signal space.

The <u>benefit</u> derived by each of these principal groups will be:

*   for the <u>primary user</u>, a more cost effective digital
    communication network for point to multi-point service;

*   for <u>broadcast</u>, <u>satellite</u>, <u>and</u> <u>cable</u> <u>operators</u>, the
    opportunity to sell spare VBI (FCI) capacity, to cross
    assist in the development of consumer teletext services
    through the shared cost of teletext plant;

*   for the developers/manufacturers, the opportunity of new
    markets, application of consumer teletext technology to
    a market area with products that are subject less to lower
    cost pressures as compared to consumer targeted products.

The viability of the approach as a whole is embodied therefore
in:

*   the <u>value/cost relation</u> whereby all parties can make or save
    money even with relatively little investment on the part of
    any; and

*   <u>timing</u> for which the technology and computer communication
    user base are both ready to implement a service NOW.

4.2. User Requirements

In this application there is often only <u>one</u> primary user – the
business organization requiring point to multi-point
communication. As a result, the source and receiving user
requirements are largely similar.

There are other parties who provide their services to make the
basic delivery system operate, and whose presence is justified
only if the primary user requirements are met.

From the point of view of the sender or source of the data
products, the following requirements on the delivery service
include:

*   low cost of bulk communications;

*   communicated data delivery may be latent from several
    minutes to several hours (in some cases), ie. the data does
    not have to be received virtually instantaneously;

*   in some cases where practical, routing control desirable for
    -- cost optimization;

*   integrity of received data (after FEC) is ESSENTIAL;

*   assurance of delivery is ESSENTIAL; and

* transport mechanism must be transparent to data type, especially to 7 and 8 bit forms.

4.3. Technical Requirements

Following the same set of steps as outlined in Article 3.3., we consider the technical requirements of the system, first at the system level, and then at the generic component level.

4.3.1. Total System

The business data delivery application system will consist of the principal generic components as outlined in Article 2.7. with the following notes:

* the application source system is represented by the current in-place computer systems which generate but almost certainly will be used to collect or concentrate the electronic form of the data to be delivered;

* a receiver-adapter terminal located at the receiving points of the system, and which may range from small printers through main-frame computers; and

* a virtual "transaction" return communication link which is represented by any mechanism to indicate problems with receipt of the the data.

As stated previously, the principal system function is to provide inexpensive point to multi-point electronic data communications on a continental or regional scale.

The overall system performance may be summarized by:

* the received error rate must be extremely low;

* the net system throughput capacity will allow for batch transmission with high level of latency, several hours to one day (typical); and

* system availability allows downtime occasionally for up to 1 or 2 hours.

As in the previous application, a system is only as good as its weakest link. Here again the potential for an unacceptable level of error rate is found in the "last mile" teletext delivery.

4.3.2. Application Source System

Assumptions: None that are known at this time.

General: Represented mostly by standard mainframe and

minicomputers with existing system software.

Function: Collect and data for transport to some other physical site.

Inputs: Physical/electrical - too general to consider (and not materially relevant to this analysis); and protocol/ function - same as for physical.

Outputs: Physical/electrical - standard communication such as dedicated telco lines, local packet networks, LAN etc. depending on specifics of the application; and protocol/function - protocols of convenience, depending on specifics of the application, but not those related to teletext delivery.

Performance: Capacity/throughput - order of 1 to 100 kbaud on output; error rate - extremely low; and availability - high.

Other: Cost - not critical, should be comparable to like equipments in the EDP industry; support - comparable to EDP industry for like equipments; and expandability - not relevant to this analysis other than the output should not be flavoured with teletext delivery dependent envelopes.

4.3.3. Teletext Gateway System

Assumptions: None that are known at this time.

General: Typically a computer system residing in a major N.A. city at the focus of several sources requiring teletext transport.

Function: Performs the "splicing" and bundling for teletext delivery of one to several data sources; performs FEC and encryption on services data (where required); and provides teletext data routing information.

Inputs: See Application Source System: Outputs.

Outputs: Physical/electrical - protocol of convenience, typically LAN or other high speed link to television-teletext system; and protocol/function - NABTS compatible for use by inserter unit at television-teletext input in non-cyclic and semi-cyclic form.

Performance: Capacity/throughput - typically from 10 to 40 kbaud of useful data at receiver-adapter (higher if continental broadcast network has capacity during the off hours); error rate - extremely low; and availability - essential that it is daily for predetermined minimal amount of time.

Other: Cost - not critical; support is comparable to EDP industry for like equipments; and expandability is not essential to this analysis.

4.3.4. Gateway Television Link

Assumptions: None that are known at this time.

General: This system component is typically a local high speed ground based link such as private or packet network to the television-teletext system. It might consist of one or more a satellite up/ down links.

Function: To provide primary communication link from teletext gateway system to the television-teletext system.

Inputs: See Teletext Gateway System: Outputs.

Outputs: Same as Inputs.

Performance: Capacity/throughput typically 10 to 40 kbaud; error rate - extremely low; and availability allows downtime for small portion of day.

Other: Cost is relatively small compared to other system components; support is typical to that for other EDP applications; and expandability is not essential to this analysis.

4.3.5. Television Teletext System

Assumptions: Built on television signal network (national, regional, local); VBI will be used by broadcasters while FCI will be used mostly by cablecasters; all teletext signal handling equipments used for traditional consumer teletext are to remain unaltered in design but not necessarily in configuration.

General: Electronic equipments located close to point where final video stream leaves plant for transmitter; and this system component(s) is located at every receive/ retransmit point in the distribution chain. In the case that input is received from a satellite downlink, this may be one or a few nodes (cable) in an urban area. If a continental scale network is used, then many (tens) of nodes may apply.

Function: Delivery of all data forms in an appropriate teletext delivery envelope on top of the existing broadcast, satellite (video) cable set of networks; mostly non-cyclic insertion with limited cyclic insertion; forward error protection and regeneration (databridges); multiple service splicing with controlled allocation of output channel bandwidth to various services (encoders, databridges); in some cases the lowest level of NABTS is to be used (and still be compatible with the delivery plant); data bridging, encoding, recirculation.

Inputs: Physical/electrical - compatible with gateway-

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television link input/outputs; and protocol/function – accept data sets (ASCII, NAPLPS, binary), see also Gateway Television Link: Outputs

Outputs: Physical/electrical – television signal VHF, UHF, and cable frequencies; and protocol/function – NABTS compatible signal injected in broadcast/cable video stream.

Performance: Capacity/throughput – from one VBI line through FCI capacity; error rate – correction to level of consumer teletext; and availability – comparable to broadcast or cable electronic equipments.

Other: Cost – of order $10 to 20K per station/node, ie. comparable to other broadcast/cable equipments; support – similar to that for other broadcast and cable equipments; and expandability – essential to allow expansion for additional service channels and mix with local content.

4.3.6. Receiver Terminal System

Assumptions: Not intended to decode NAPLPS.

General: Integrated unit complete with tuner and adapter logic with interface to receiving computer, VDT or printer.

Function: One data stream only received; forward error correction and detection; terminal uniquely addressable; decryption of protected data; teletext envelope removal; output all data types (7 and 8 bit) which may include NAPLPS (not primary); and interface to most popular computers, printers or VDT's.

Input: Physical/electrical – video UHF, VHF, Cable frequencies; and protocol/function – contains all required forward error protection, encryption of data, and addressability data.

Output: Physical/electrical – serial or computer bus interface; and protocol/function – unit version to interface to variety of personal computers, printers and VDT's (ie some smart and dumb devices).

Performance: Capacity/throughput – 2 to 20 kbaud net (after NABTS, FEC, encryption) per data channel; error rate – very low after FEC applied; and availability – comparable to personal computer equipments.

Other: Cost – approximately up to $1000 acceptable depending on features; support – typical for EDP peripherals; and expandability – will accept all potential NABTS related services.

4.3.7. Transaction Return Link

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Since this type of data distribution is performed on a semi
regular basis, a return communication link to the source is
generally not required. This statement is based on the following
reasonable assumptions:

*   that the level of forward error protection is of a
        sufficient level to not have cause for retransmission
        requests; and

*   that the overall system can assure a level of delivery
        performance that does not require an unscheduled
        retransmission.

In those situations for which it is required, together with the
assumption that the level of return traffic will be low, the
usual approaches of using dial-up, leased line or packet switched
networks will suffice.

The return communication mechanism is not essential to this
analysis.

Business Data Delivery

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5. CONSUMER CATALOGUE SHOPPING

5.1. The Application

By the term CONSUMER CATALOGUE SHOPPING we mean the process of
a consumer perusing in the home through an "electronic"
catalogue, being able to perform comparative shopping, being able
to view television picture quality images on request of purchased
items, and to be able to perform the purchase transaction
process. This approach will enable the consumer to perform
general shopping more easily, on a better informed basis, and
ultimately more cost effectively than with traditional methods.

5.1.1. Problem & Opportunity

In the United States over the last decade, many municipalities
had issued franchises to cable companies on the promise of
delivery of major and attractive home services - primarily of a
television program nature. Unfortunately many of the promises
were not kept because of the unforseen exorbitant high cost of
providing them.

Currently, many of the cable franchise licenses are coming up for
renewal, and there is a concern on the part of cable companies
that these may not be renewed unless the cable operator is able
to provide convincing visibility to new service offerings. At
the same time there are a number of municipalities who, to date,
still have not issued their first cable franchise because of
their concerns for the actual quality of service to be provided
in the light of the bad experience of municipalities who had.

Major merchandising chains (United States) are looking to improve
their sales revenues through the provision of easy comparative
shopping. Current catalogue and advertising mechanisms do not
have this capability.

The opportunity lies with the synergism of need, technology,
financial viability in several respects:

*   availability of unused television channel capacity (FCI) on
        cable;

*   the need of cable franchisees and merchandisers for each
        other;

*   -   the imminent availability of cost effective technology; and

*   the relatively low operational cost (compared to live
        television programming) of the service.

5.1.2. Alternatives

The fundamental assumption in providing alternatives to addressing the application opportunity will be that the average consumer will perceive value and be inclined to make procurements from television teletext-like (or better) advertisements.

Some current approaches to "catalogue" shopping include of course:

*   traditional paper catalogues and flyers;

*   television and radio; and

*   newspapers.

Conceptually new approaches include:

*   home video disk catalogues with telephone or written purchasing;

*   public access terminals with video disks, text and graphic overlays; and

*   teletext based services.

5.1.3. Selected Approach

The teletext based approach is considered to be optimal for several reasons:

*   for the cost/value relationship videodisks are not readily updateable and require expensive player to be used, public access terminals not located in the convenience of the home, and teletext based service has inherently the structure required by a catalogue service and is relatively cost effective;

*   with respect to technology, the teletext approach will require development of moving (ideal) and static (acceptable) video quality images on a random accessible basis, however the available current technology should be able to accomodate this;

*   all of the key components - need, acceptance, technology - are all present now; and

*   most importantly while the consumer market may require psychological preparation for the concept, correctly presented it would be considered acceptable.

5.1.4. The Model

We again consider the basic model for the proposed application in consideration of the needs, their fulfillment and basic economics. Every link of the chain must be satisfied to make the application viable.

The underlying assumption in putting forth the teletext approach is the consumer user acceptance of the medium.

The primary users will be:

*   the merchandising chains or application source (the likes of a Sears, Montgomery Ward) who will provide electronic catalogue shopping services, require continental distribution and administrative services, would be willing to pay operator to provide "delivery" infrastructure service and who wish to participate with other merchandisers in "comparative" electronic shopping; and

*   the average consumer or application end-user who, from home, will be able to perform comparative product review and shopping for goods initially offered by the merchandisers, to see color pictorial images of television quality upon request to confirm appearance of product, to purchase the selected item, and for whom the value of the service will be in performing the shopping function on a more informed, cost effective and timely basis than using traditional methods.

The system and service operators who make possible the offer and transaction between the primary users will include:

*   service operators will arrange for distribution of receiver decoders, signal distribution arrangements, and support;

*   broadcast, satellite and cable operators will set-up teletext signal plant and provide VBI or FCI signal space; and

*   local cable operator will install and lease receiver/decoder unit and provide maintenance.

Key equipment and system components will be supplied according to:

*   teletext gateway systems: provided by system houses or by in-house technical group of service provider;

*   consumer end-user terminal: developed and supplied by terminal manufacturer;

*   teletext delivery equipment: developed and supplied by companies specializing in teletext signal plant equipment design and manufacture; and

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* television distribution infrastructure (cable and satellite): already in place.

The participating parties and the benefit provided to them include:

* merchandising/publishers will obtain an increased level of purchasing (impulse) with lower selling cost (more competitive), merchandisers can sell goods more cost effectively, can respond and poll market reaction immediately;

* consumer can make more prudent selection of goods together with potential for lower prices;

* cable television operators will be able to retain or sell new franchises, aid in development of teletext services; share cost of teletext plant

* service providers will be able to exploit new business opportunity whereby one system can provide communication service to a variety of parties; and

* manufacturers will have new market opportunity, application of consumer teletext technology to another market area.

The proposed application is viable in that:

* the value/cost relation exists in that all parties can make or save money although investment capitalization is large to set up operation; and

* the timing is appropriate with technology ready to provide service NOW although some user attitudes, habits and education will be required.

5.2. User Requirements

The primary users of the system present the basic application requirements, with those of the system operators being derived in a secondary manner.

5.2.1. Application Source

The application source or merchandiser will have the following principal requirements of the service:

* transaction capability in the home using telephone, smart or credit cards;

* access large base of decoders (millions);

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*   provide the best quality video sequence on demand to the viewer;

*   users accessible on VHF,UHF, and cable frequencies;

*   provide comparison shopping decision awareness;

*   ensure that consumer feels comfortable with browsing, selecting and purchasing goods from interactive video catalogue; and

*   support a catalogue of 10,000 to 60,000 items for which majority will have companion video frame(s).

5.2.2. Application Consumer End-User

The application consumer end-user will have the following general requirements:

*   general ease of installation, operation and maintenance (terminals may very well be installed by the service provider);

*   to feel as if they have full control over transaction ie should not be uncomfortable with process;

*   normal home services should not be compromised (eg tie up of the telephone);

*   no or low cost, with easily identified service value;

*   good response to interactive requests; and

*   sufficient quality of product pictorial presentation eg. television quality.

5.3. Technical Requirements

Based on the general primary user requirements, together with a prototypical design, we now examine the technical requirements of each of the system and its principal components.

5.3.1. Total System

The principal system assumption is that local distribution by cable only is viable to meet requirements.

The principal system components are similar to those outlined in the generic system model as outlined in Article 2.7. with the following points to be noted:

*   the <u>application source system</u> includes the capability to

produce the requisite video frames to accompany the encoded
data in the cycle;

*   the teletext gateway system also handles video frames
        (sequences);

*   the user terminal system has a credit-card reading device;
        and

*   the transaction return link is used to make the purchase.

Requirements for each of these system components will be
discussed separately below.

The general function of the total system is summarized by:

*   merchandiser arranges for the preparation of electronic
        cataloque consisting of NAPLPS graphic/text pages and
        complementary video frames;

*   this data is forwarded to a transport service operator who
        will distribute it to each of the major urban centers;

*   at each urban center, a cable operator will run a FCI
        service consisting of teletext pages and video sequences,
        perhaps over several spare channels;

*   using a receiver adapter transaction terminal, the home
        consumer peruses a teletext data base doing comparative
        shopping

*   when a good image (video frame or sequence is required) he
        indicates this, and the video frame(s) are shown;

*   satisfied with the information, the consumer makes his
        selection and performs the purchase transaction using a
        credit card together with communication to the transaction
        processor;

*   delivery of the selected item(s) are made shortly.

In a general way, communication on the "last mile" cable delivery
will require:

*   that data delivered on broadcast signal must be compatible
        with NABTS, but may require enhancements to meet special
        application requirements;

* --   the addition of video (perhaps highly compressed) which is
        not compatible with NABTS but supplied simultaneously on
        free video channels.

Total system performance requirements is given in three respects:

*   received error rate which must be relatively low and not

affect service response appreciably, noting that different information types require different levels of forward error protection

* the net system <u>throughput</u> <u>capacity</u> must be such that the end-user has access to any of 10 to 100 thousand pages in several seconds, and to video frames (sequence) in several tens of seconds; and

* <u>availability</u> of the catalogue service system is such that it can be inoperative occasionally for up to an hour (similar to television).

This system will be only as good as its weakest link, in this case being the bandwidth available for fast access to video frames (sequences).

Attention is now given to each of the generic system components, in a self-similar way, with consideration to assumptions (if applicable), general orienting description, function, inputs (usually identical to outputs of the preceding block), outputs, performance and other factors.

5.3.2. Application Source System

<u>Assumptions</u>: Although the span of function of these systems is larger, they will have to mesh with activity in traditional advertiser driven teletext.

<u>General</u>: The application source system's consist mostly of standard mainframe and minicomputers, picture creation systems, video production systems and transaction and accounting databases. Typically each major merchandiser would have such a production capability in any of the major N.A. cities. Service bureaus for smaller merchandisers would also exist on a similar scale.

<u>Function</u>: To prepare all picture/text pages, video frames (sequences), pricing information; and to structure all visual and costing data.

<u>Inputs</u>: Anything and everything including video sequences and stills, and photos; physical/electrical - too general to consider (and not materially relevant to this analysis); and protocol/ function - too general to consider (and not materially relevant to this analysis).

<u>Outputs</u>: Physical/electrical - standard communication such as dedicated telco lines, local packet networks, LAN etc; and protocol/function - protocols of convenience, depending on specifics of the application together with video discs, tapes etc.

<u>Performance</u>: Capacity/throughput - of order of several megabits

per second and as required for video; error rate - low; and
availability - high.

Other: Cost - not critical, and should be comparable to like
equipments in the EDP industry; and support - comparable to EDP
industry for like equipments; and expandability - not materially
essential to this analysis.

5.3.3. Teletext Gateway System

Assumptions: None that are known at this time.

General: Typically a system consisting of a computer(s) and
video handling equipments (disc) for random access.   These would
be located in a few of the very largest N.A. cities.

Function: Performs the "splicing" and bundling for teletext
delivery of NAPLPS data for several (few) shopping services;
performs FEC services (where required); communicates necessary
information to account management system; and organizes and
controls video cycle sequences.

Inputs: See Application Source System: Outputs.

Outputs: Physical/electrical - protocol of convenience,
typically LAN or other high speed link to gateway television
link, and also video channel(s) to transverse video frames; and
protocol/function - in form compatible for encoder/recirculator
at teletext delivery system input, and video NTSC compatible with
cable plant video equipments.

Performance: Capacity/throughput - typically from 10 to 40 kbaud
of useful data at receiver adapter; error rate - low; and
availability - high.

Other: Cost - not critical; support - comparable to EDP industry
for like equipments; expandability - not essential to this
discussion.

5.3.4. Gateway Television Link

Assumptions: None that are known at this time.

General: Variety of communication links possible including
satellite narrow and wide (full video) channel to earth stations.

Function: To provide primary communication link from teletext
gateway system to television-teletext system, the latter being
located at the cable system head-ends across the continent.

Inputs: See Teletext Gateway System: Outputs.

Outputs: Same as Inputs.

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<u>Performance</u>: Capacity/throughput - one to several video full channels in bandwidth; error rate - extremely low; and availability - high.

<u>Other</u>: Cost - not critical for large receiver-decoder population; support - comparable to that for other satellite links; and expandability - possibility of adding more satellite video bandwidth channels if required.

5.3.5. Television Teletext System

<u>Assumptions</u>: Built on local cable television network using one to several full channels for teletext and companion video frames; and all teletext signal handling equipments used for traditional consumer teletext are to remain unaltered (in design but may be extended in configuration).

<u>General</u>: Teletext insertion equipments will be located at cable head-end for franchise (urban) region and at every receive/ retransmit point in the distribution chain (typically of urban scale); and video frames, either single or sequence, to be delivered on adjacent or same video channel.

<u>Function</u>: To take catalogue pages, coded in NAPLPS, broadcast cycle organization information and video frames, either independent or sequences, and to deliver these on one or several spare cable channels so that they may be received, captured and decoded by an appropriate NABTS receiver-adapter.

<u>Inputs</u>: Physical/electrical - same as teletext gateway system outputs; and protocol/function - same as teletext gateway system outputs.

<u>Outputs</u>: Physical/electrical - standard NTSC onto cable television; and protocol/function - NABTS compatible signal injected in broadcast/cable video stream which also contains NTSC video frames.

<u>Performance</u>: Capacity/throughput - from one VBI line to FCI capacity; error rate - correction to level of consumer teletext; and availability - comparable to broadcast or cable electronic equipments.

<u>Other</u>: Cost - of order $30 to 50K per station/node; comparable to other broadcast/cable equipments; support - similar to that for other broadcast/cable equipments; and expandability - must allow expansion for additional service channels and mix with local content.

5.3.6. User Terminal System

<u>Assumptions</u>: Technology available at price to provide video

frame (or sequence capture); that the average user will react favourably and accept the quality of a video frame for shopping purposes.

General: Set-top unit complete with tuner and decoder, electronic card reader and remote IR keyboard.

Function: To capture specific video frames and display television quality colour images (1/4 screen size minimum and static minimum); forward error correction and detection; unique terminal identification, ie addressable; remove teletext envelope; decode NAPLPS data; must be able to perform purchase transaction with credit card, ID etc (need good return link; and to provide a return communication interface be it over cable or telephone (perhaps with an auxiliary line).

Input: Physical/electrical — video UHF,VHF, cable frequency, possibly on several channels for large video library; and protocol/functional — contains all required forward error protection, encryption of data, addressability data, and video stills or moving frames.

Output: Physical/electrical — RF composite video to television set; and protocol/function — not applicable.

Performance: Capacity/throughput — critical only in that access time should be of order 5 to 10 seconds to access a select page from a set that may be of order 10 to 60 K pages of 2 kbytes each together with companion video; error rate — low after FEC applied; and availability — comparable to consumer tv appliances.

Other: Cost — approximately $150 acceptable depending on features, rental is possible, installation fee of $40; support — typical for cable tuner products; and expandibility — will accept all potential NABTS related services (ie. keep special service extensions soft or in personal computer).

5.3.7. Transaction Return Link

Assumptions: None known at this time.

General: User must be able to transact purchase — credit card and ordering information must be returned to transaction processor.

Function: To provide communications from the user terminal system to the transaction processor; to ensure transaction data integrity and security; and to not interfere with normal household telephone operation (substantially).

Inputs: Physical/electrical — either telco related or cable (or other perhaps yet unidentified approach); and protocol/function — to be determined but must make provision for data integrity and security.

Outputs: Physical/electrical - determined by inputs; and protocol/function - determined by inputs.

Performance: Capacity/throughput - low data rate ie about 100 bytes over several seconds, effectively a trickle rate; error rate - very low; and availability - always when terminal being used for transaction.

Other: Cost - must be negligible compared to monthly rental or transaction cost; support - comparable to most cable or telco communication systems; and expandability unknown at this time.

Consumer Catalogue Shopping

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6. ELECTRONIC SOFTWARE PUBLISHING

6.1. The Application

We use the term SOFTWARE PUBLISHING to identify the process
whereby organizations who develop software products can market,
advertise, deliver and support these products entirely with the
aid of electronic communication systems.

6.1.1. Problem & Opportunity

In the software business there is ever increasing competition for
share of an ever burgeoning market, most particularly for
personal computers. To effectively address this market, the
principal needs of software publishers include:

*   a more responsive distribution and support mechanism;

*   better mechanism to market and sell software;

*   better software support mechanism;

*   software rental and trial; and

*   control of usage (ie. copyright, duplication).

The unparalled opportunity is embodied in:

*   the unused television channel capacity (VBI and FCI) on a
        continental, regional and local basis; and

*   proliferation of personal computers and unabated demand for
        awareness and use of good software.

6.1.2. Alternatives

The basic assumption with this application is that current
personal computer software publishing, merchandising and support
would welcome an improvement.

The current approach to personal computer software marketing and
sales is either through:

*   computer store retail; and

* -- discount mail order.

New possibilities exist with:

*   direct broadcast satellite (DBS) distribution;

*   public and packet switched (telephone) networks; and

*   teletext based distribution.

6.1.3. Selected Approach

We consider the optimal approach to personal computer software
publishing to be teletext based. The reasons include:

*   the cost/value relation is readily established in that
        current approaches clumsy and unresponsive, DBS expensive
        for the single user, and teletext based service relatively
        inexpensive to implement;

*   virtually all technology available today;

*   market ready now; and

*   acceptance should be good if all functional, performance and
        cost requirements met, although some careful marketing may
        be required to make all feel comfortable with the concept.

6.1.4. The Model

We now table the basic model for the proposed application in
consideration of the needs, their fulfillment and basic
economics. Every link of the chain must be satisfied to make the
application viable.

The basic assumption is that personal computer users will accept
the concept of selecting and purchasing software entirely by
electronic means.

The primary users of the application will be:

*   software developers and publishers will engage services of
        distribution operator to distribute demo packages, software
        code, documentation as well as updates of the latter two;
        and

*   the end-users of personal computers who wish to have
        exposure to new software, make their selection and purchase
        and be fully supported, all in a cost effective manner.

To provide the means by which the primary application users may
fulfill their activity, the application system operator(s) will
consist of the following group:

*   service operators who will arrange for the distribution of
        receiver-adapters, signal distribution arrangements, and
        actual service operations including transaction processing;

*   broadcast, satellite and cable operators will set-up
        teletext signal plant and provide VBI or FCI signal space

for "last mile" teletext based delivery; and

*   local computer store vendors who will sell receiver-adapters
    and provide maintenance.

The principal equipment components and their suppliers include:

*   teletext gateway systems which are provided by system houses
    or by in-house technical group of service provider;

*   end-user receiver-adapter which is developed and supplied by
    terminal manufacturer;

*   teletext delivery equipments which are developed and
    supplied by companies specializing in teletext signal plant
    equipment design and manufacture; and

*   the television distribution infrastructure, already in
    place, and held by broadcast and cable people.

The benefit derived for each of the principal groups concerned
includes:

*   software publishers can be more responsive to wide user
    community with product support (enhancements), provide a
    more cost effective product by eliminating the middle man in
    the current distribution process, have control of usage
    (potentially more revenue, and have customers more aware of
    their products;

*   the personal computer end-user has a higher awareness level
    of products available (can easily try out on limited basis),
    is able to receive more timely updates, and obtain the
    product for lower cost (middleman is circumvented and fancy
    product packaging eliminated, some estimates indicate that
    the receiver adapter will be able to pay for itself after
    the purchase of two or three software packages, those that
    typically sell for $400 or 500.

*   the television broadcast and cable operators will be able to
    obtain revenues from the sale of spare VBI (FCI) capacity,
    obtain some cross assistance in the development of consumer
    teletext services through the sharing of cost of teletext
    plant, and help with ownership of VBI in cable for
    broadcasters;

*   service providers will be able to access a new business
    opportunity whereby one system can provide communication
    service to a variety of parties; and

*   manufacturers will have a new market opportunity, based on
    the application of consumer teletext technology, to another
    market area, as well the benefit less downward costing
    pressure compared to consumer targeted products.

Electronic Software Publishing

The viability of the approach is embodied in:

*   the value/cost relation is one for which all parties can
    make or save money even with relatively little investment by
    any of the individual parties; and

*   the timing is right now with the availability of technology
    and personal computer base ready to accept service NOW.

6.2. User Requirements

Fulfillment of the primary users' requirements is fundamental to
the success of the service. All other groups involved with the
system can justify their existance only if the basic requirements
of the primary users are met.

6.2.1. Application Source

The software publishers will have the following requirements for
an electronic software delivery system:

*   access large base (millions) owners of variety of personal
    computers;

*   general addressability and control of user access to service
    AT ANY and ALL TIMES;

*   be assured of user received data (software programs)
    integrity, ie that all software is received intact (after
    all correction mechanisms applied);

*   users accessible on VHF,UHF, cable frequencies;

*   perform all aspects of software distribution: marketing and
    demonstration, sales, delivery, and support;

*   cost effective delivery compared to traditional approaches;

*   ease of using service to perform publication for small
    software vendors; and

*   payment administration.

6.2.2. Application Consumer

The personal computer end-user, a purchaser of the software will
have the following general requirements:

*   ease of installation and maintenance of the receiver-
    adapter;

* better awareness of product availability, capability on an absolute and comparative basis, by being able to test new software without commitment to purchase;

* to procure software products more cost effectively than by current techniques.

* receive all documentation and software maintenance updates;

* to not tie-up computer system while receiving/acquiring bulk delivery of packages; and

* be able to access other types of services.

6.3. Technical Requirements

With an overview of primary-user needs, we now address the technical aspects of a prototypical system on which the application will operate.

We consider the technical requirements at a system level first, followed by those at a major component level.

6.3.1. Total System

The principal components of an electronic software publishing delivery system are similar to the model outlined in Article 2.7. with the following notes:

* the software "soft" publication preparation system is the application source system;

* a teletext gateway system which "packages" software product data for teletext delivery including all protection mechanisms, as well as user control functions;

* the gateway to television link may be a land line or satellite channel (narrow band) to television and cable insertion points across the country;

* the end-user personal computer system with receiver-adapter for acquires, collects and forwards software data to the user computer; and

* the transaction return link for the request of service delivery and for effecting payment is typically expected to be by telephone transaction.

The general operation would proceed as follows:

* software publisher develops package in electronic form including demonstration programs/flyers, actual program and documentation;

and all manner of inputs and interfaces possible.

Outputs: Physical/electrical - standard communication such as
dedicated telco lines, local packet networks, LAN etc; and
protocol/function - protocols of convenience, depending on the
specifics of the application.

Performance: Capacity/throughput - order of 5 to 50 kbaud; error
rate - extremely low; and availability - high.

Other: Cost - not critical, should be comparable to like
equipments in the EDP industry; support - comparable to EDP
industry for like equipments; and expandibility not essential to
the analysis.

6.3.3. Teletext Gateway System

Assumptions: None known at this time.

General: Typically a computer system residing in a city at the
focus of several sources requiring teletext transport.

Function: Performs the "splicing" and bundling for teletext
delivery of several (many) information services; performs FEC and
encryption on services data (where required); communicates
necessary information to account management system; and organizes
receiver-adapter addressing and control information for
distribution.

Inputs: See Application Source System: Outputs.

Outputs: Physical/electrical - protocol of convenience,
typically LAN or other high speed link to gateway-teletext link;
protocol/function - NABTS compatible for use by inserter unit at
television-teletext input in non-cyclic and semi-cyclic form.

Performance: Capacity/throughput - typically from 10 to 40 kbaud
of useful data at receiver adapter; error rate - extremely low;
and availability - high.

Other: Cost - not critical; support - comparable to EDP industry
for like equipments; and expandability - not essential to this
discussion.

6.3.4. Gateway Television Link

Assumptions: None known at this time.

General: Variety of communication links possible including
satellite narrow and wide (full video) channel to earth stations.

Function: To provide primary communication link from teletext
gateway system to insertion point of television-teletext system.

Inputs: See Teletext Gateway System: Outputs.

Outputs: Same as Inputs.

Performance: Capacity/throughput - typical 10 to 40 kbaud; error
rate - extremely low; and availability - high.

Other: Cost - not critical for large receiver-adapter
population; support - comparable to that for other satellite
links; and expandability - not essential to this discussion.

6.3.5. Television Teletext System

Assumptions: Built on television signal network (national,
regional, local), although principally local because of data rate
and expected capacity shortage on continental network links; VBI
(FCI at night) will be used by broadcasters while FCI (possibly
VBI) will be used by cablecasters; and all teletext signal
handling equipments used for traditional consumer teletext are to
remain unaltered (in design but not necessarily in configuration
and size).

General: Electronic equipments co-located at point where final
video stream leaves plant for transmitter and at every
receive/retransmit point in the (local likely) distribution
chain.

Function: Mostly non-cyclic streams with limited cyclic
insertion; forward error protection and error regeneration
(databridges and regenerators); multiple service splicing with
controlled allocation of output channel bandwidth to various
services (encoders, data bridges etc.); in some cases the lowest
level of NABTS is to be used (and still be compatible with the
the delivery plant); and data bridging, encoding, recirculation.

Inputs: See Gateway Teletext Link: Inputs and Outputs.

Outputs: Physical/electrical - NABTS compliant; and protocol/
function - NABTS compatible signal injected in broadcast/cable
video stream with possible extensions to NABTS.

Performance: Capacity/throughput - from one VBI line to FCI
capacity; error rate - correction to level of consumer teletext;
and availability - comparable to broadcast or cable electronic
equipments.

Other: Cost - of order $10 to 20K per station/node; comparable
to other broadcast/cable equipments; support - similar to that
for other broadcast/cable equipments; expandability - must allow
expansion for additional service channels and mix with local
content.

6.3.6. User Terminal System

Assumptions: Not intended to decode NAPLPS although this may be possible later.

General: Either personal computer inboard module with external (internal ideal) tuner, or external unit complete with integrated tuner.

Function: To select from one to several services on priority basis; cache (64K to 512K) captured data to prevent tie-up of hosting personal computer; forward error correction and detection; unique terminal identification for service addressing to arm for service and product reception, and to protect software usage on unauthorized machines; decryption of protected services; teletext envelope removal; output software code, documentation (ASCII) (and perhaps NAPLPS); interface with most popular personal computers.

Input: Physical/electrical — video UHF,VHF, cable frequency; and protocol/function — contains all required forward error protection, encryption of data, addressability data etc.

Output: Physical/electrical — serial or computer bus interface; protocol/function — unit version to interface to variety of standard and popular personal computers.

Performance: Capacity/throughput — 10 to 40 kbaud net (if personal computer can digest) (after NABTS, FEC, encryption) per service; error rate — very low after FEC applied; availability — comparable to personal computer equipments;

Other: Cost — approximately $300 to $700 acceptable depending on features, rental is possible, installation fee of $40; support — typical for personal computer peripherals; expandability — will accept all potential NABTS related services (ie. keep special service extensions soft in adapter or in personal computer).

6.3.7. Transaction Return Link

For the purpose of signing up onto the service, to place an order for a selected software package, report a missed software delivery, or software problem, a telephone call will be placed by the user. Typically some 800 number will be used. The call will be taken by an operator who will log the request in an administrative/transaction computer for further action.

The resulting action will be conveyed to the user employing the teletext delivery mechanism, targeted either specifically to him or an entire group of users if warranted.

Eventually, modem call-back may be implemented, but this is not necessary in the short term.

The opportunity lies in the fact that:

*   NABTS provides uniform low cost mechanism to implement a
        variety of applications;

*   NABTS receiver-adapter and teletext plant technology is
        imminently available; and

*   a potential synergy exists between the technical
        requirement for implementation of these value added
        functions and the "classical" teletext technology.

7.1.2. Alternatives

Some of the current approaches to providing television viewer
service enhancements include:

*   multi-lingual sound over-dub using auxilliary sound channel;

*   specialized cable adapter boxes with address and control (eg
        Zenith Z-TAC); and

*   stereo sound supplement (DBX) for television.

New alternatives include:

*   viewer program access control using NABTS compatible
        teletext;

*   utility load shedding using teletext based control;

*   multi-lingual sound over-dub using a teletext based digital
        data channel;

*   voice message store and forward using teletext based digital
        data channels.

7.1.3. Selected Approach

We discount the voice message store and forward using teletext
compatible delivery because the channel capacity occupied for the
delivery of a message to one individual is unjustifiably high.
Telephone based systems are more performance and cost effective.

We also discount for the purpose of this report, the audio
over-dub with digitally distributed data using a teletext channel
because the design and implementation involves an extension to
the presentation layer of teletext. In addition, it is in
reality an enhancement to teletext rather than to television.
The problem is already adequately treated in previous studies on
sound descriptor instructions that NORPAK has performed for the
Department of Communications. In principle the bandwidth
required for a reasonable sounding encoded/decoded audio voice is

compatible with that available in a broadcast teletext service.

Many of the teletext based addressing and control function are practical because the actual amount of data directed to a specific decoder is relatively small. We select for purposes of this study the requirements for the provision of load shedding control and viewer program access control for their potential to increase revenues. Our reason is as follows:

*   a large portion of the equipments, both at the cable head-
      end and in the consumer's receiver and used for standard
      consumer teletext services, can also be used for the subject
      new services;

*   virtually all technology available today;

*   market ready now; and

*   acceptance should be good if correct services are provided.

Implementation of these new services in the absence of the standard teletext service is at best questionable in its economic viability.

7.1.4. The Model

We now consider the basic model for the proposed application in consideration of the needs, their fulfillment and basic economics. All aspects must be satisfied to make the application viable.

The basic assumption to be made is that home consumers can obtain savings through the use of utility load shedding, and that they will be willing to pay for tiered viewing and/or pay as you watch services.

The primary users of the application will be:

*   the cable operators who are looking to obtain more revenues
      from subscribers in the case of tiered viewing control, and
      the utilities in the case of load shedding; and

*   the home consumer or end-user who will perceive better
      viewing possibilities or reduced utility costs.

To provide the vehicle by which the primary users will be able to perform their function, there will be one system operator, namely the local cable operator who will:

*   set-up teletext signal plant and provide VBI or FCI signal
      space for control information; and

*   install under lease a receiver adapter unit and provide
      maintenance.

The equipment and system components and their _suppliers_ include:

*   teletext gateway systems which will be provided by system
        houses or by in-house technical group of service provider;

*   television distribution infrastructure which is already in
        place;

*   the teletext television system equipments such as inserters,
        encoders and databridges, which will be developed and
        supplied by companies specializing in teletext signal plant
        equipment design and manufacture; and

*   consumer end-user terminal which will be developed and
        supplied by terminal manufacturer.

The benefit derived for each of the principal groups involved
includes:

*   utilities, (load shedding) who will be able to operate more
        efficiently through the leveling of power loading, and thus
        save on expansion capitalization costs;

*   the consumer who will receive a lower electric bill (load
        shedding), or cost effective television entertainment;

*   the cable operators who will enhance revenues through the
        service they provide to utilities (load shedding), increase
        revenues from consumers with tiered programming, and
        possibly distribute the costs of teletext signal handling
        equipments used for "classical" teletext services; and

*   the manufacturers for whom the new application presents the
        opportunity of applying consumer teletext technology to
        a closely related market area.

The viability of the approach is embodied in:

*   the _cost/value_ synergism for all concerned; and

*   the _timing_ for which the technology is available to be
        incorporated into the service NOW, and the restlessness of
        cable operators and utilities to their needs now.

7.2. User Requirements

For the primary users of the application, there are some basic
and general requirements that must be met in order to consider
the application of value.

7.2.1. Application Source

Consumer TV Related Service Enhancement

In the case of utility load shedding, the utility company will require:

*   access to a large base of receiver adapters (millions);

*   that users be accessible on an individual (regional) and global basis;

*   an easy and practical interface to the consumers power consuming appliances;

*   that home consumers will not be annoyed by the installation and operation of the load shedding adapter; and

*   that the user will have the ability to over-ride the control mechanism if necessary.

In order to simplify the process, special billing is not required. Power will be metered at different rates depending on the time of day and corresponding cost of power.

For tiered service viewing, cable operators will require many, but not necessarily all, of the following capabilities:

*   direct addressability of up to several million decoders;

*   ability to send individual decoders keys to arm the receiver-adapter to be able to access specific services;

*   the ability to access decoders on a group basis;

*   the ability of the user receiver adapter to interpret a variety of received commands related to the control of services as seen by the user;

*   the ability to be armed by the user to decrypt specific programs for viewing, with the capability of storing information, for later enquiry by the cable operator, so that viewing charges may be levied.

7.2.2. Application Consumer

For utility shedding, the home consumer will require that:

*   installation, operation and maintenance will be both easy and unobtrusive relative to his current daily habits; and

*   utility bills will be significantly lower.

In the case of tiered viewing services, the home consumer will want:

*   ease of installation, operation and maintenance, with little

interference to normal household habits;

*   optimal packages of tiered programs for viewing;

*   interlock control of programs to be viewed by children; and

*   good entertainment value, including all installation and
    receiver adapter fees etc., compared to alternate forms such
    as movie theaters, sport events, concerts etc., ie. the user
    must perceive value for money.

7.3. Technical Requirements

With the primary user needs in hand, we now address the technical
requirements for a system and its components to make this
possible. The system as a whole is considered, followed by its
principal components.

7.3.1. Total System

Principal components of the consumer viewer enhancement system
would be:

*   a utility or tiered viewing application source system(s);

*   a teletext gateway system which splices all control
    information and prepares it for teletext delivery;

*   a television teletext transport system

*   a consumer receiver-adapter terminal unit system; and

*   a return transaction link in the case of tiered viewing.

Requirements for each of these components will be discussed
separately below.

The general function of the total system may be summarized by:

*   utility or cable operator (MSO) generates all arming and
    control data to be sent to consumers on either an individual
    or group basis;

*   cable operator sends address and control information to each
    decoder or group of decoders;

* .. viewer may access those services for which he has subscribed
    and for which the receiver is armed; and

*   tiered (or pay per view) usage may require data sent back to
    central administrative system.

The overall system performance is characterized in three respects:

* the <u>received error rate</u> which should be low;

* the net <u>system throughput</u> capacity should be such that several hundred thousand receiver-adapters may be individually (if so required) addressed and updated within minutes; and

* <u>availability</u> should be comparable to that for most television services for tiered viewing, and high for utility load shedding

7.3.2. Application Source System

<u>Assumptions</u>: Utilities and cable operators will be the source.

<u>General</u>: Standard computer systems will be used co-located with the cable head-end.

<u>Function</u>: To assimilate power requirements and availability, and to determine load distribution and timing for consumer regions and individuals; and to manage tiered viewing services by individual viewer.

<u>Inputs</u>: Physical/electrical – standard communication such as dedicated telco lines, local packet networks, LAN etc; and protocol/function – protocols of convenience, depending on application.

<u>Outputs</u>: Physical/electrical – standard communication such as dedicated telco lines, local packet networks, LAN etc; and protocol/function – protocols of convenience, depending on specifics of the application.

<u>Performance</u>: Capacity/throughput – order of several hundred kilobaud; error rate – very low; and availability – high.

<u>Other</u>: Cost – not critical, should be comparable to like equipments in the EDP industry; support – comparable to EDP industry for like equipments; expandability – not essential to this analysis.

7.3.3. Teletext Gateway System

<u>Assumptions</u>: Operated by cable MSO or local.

<u>General</u>: Typically a computer system residing in the same urban area as the cable head-end to be serviced.

<u>Function</u>: Performs the "splicing" and bundling for teletext delivery of control service/functions; performs FEC and

Consumer TV Related Service Enhancement

allocation of output channel bandwidth to various services (encoders, data bridges); in some cases the lowest level of NABTS is to be used (and still be compatible with the the delivery plant); and data bridging, encoding, recirculation.

Inputs: See Gateway Teletext Link: Outputs.

Outputs: Physical/electrical - RF modulated video at cable frequencies; protocol/function - NABTS compatible signal injected in broadcast/cable video stream.

Performance: Capacity/throughput - from one VBI line to FCI capacity; error rate - relatively low; and availability - comparable to broadcast or cable electronic equipments.

Other: Cost - of order $10 to 20K per station (node); comparable to other broadcast/cable equipments; support - similar to that for other broadcast/cable equipments; and expandability - must allow expansion for additional service channels and mix with local content.

7.3.6. Consumer Terminal System

Assumptions: None that are known at this time.

General: Set-top unit complete with tuner and decoder electronics, perhaps a credit card reader and remote IR keyboard; interface to house power consuming utilities such as water heater, stove, air-conditioner, some lights, etc.

Function: Forward error correction and detection (minimal); unique terminal identification for tiered services; decryption of protected services; teletext envelope removal; output NAPLPS, ASCII and other data; interface to household utility devices; television signal decryption and control; remote control; and programmability of services.

Input: Physical/electrical - video UHF,VHF, cable frequency; and protocol/function - contains all required forward error protection, encryption of data, addressability data.

Output: Physical/electrical - television VHF channel 3 or 4, and suitable interface to household utilities; and protocol/function - television video for tiered viewing services, and appropriate signals for controlling household utilities.

Performance: Capacity/throughput - comparable to "classical" broadcast teletext service; error rate - very low after FEC applied; and availability - comparable to consumer television appliances.

Other: Cost - less than about $100 is acceptable depending on features, rental is possible, installation fee of $40; support - typical for consumer home television appliances; and

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expandibility – this receiver adapter is a good candidate for NABTS functionality as well as providing business information and software publishing reception functions.

7.3.7. Transaction Return Link

Utility load shedding will not require a transaction return link as benefit will appear in the form of reduced rates for the consumer and lower capital and operating costs for the power utility. Tiered viewing services could conceivably require periodic enquiry of user pay per view access, while monthly (or annual) subscription to packaged services will not.

Several possibilities exist for implementation of this link. Ideally the home consumer will not be cognizant of its presence, in fact will probably object to any perceived disturbance of normal household practices such as the use of telephone services held in abeyance while the receiver adapter is being read by the cable operator administration system.

The possibilities for enquiry include:

*   user reporting, over the telephone, usage data that is
      stored on the receiver adapter;

*   automatic enquiry by telephone of the receiver adapter; or

*   automatic transmission on a per instance or store and
      deliver basis over cable.

These will be examined in the design alternatives report.

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8. APPLICATIONS FOR SPECIAL CONSIDERATION

So far in this study we have taken some of the more important and
technically unique applications for new teletext services under
examination in a structured and systematic manner. However, for
the remaining applications that have been tabled, special
treatment is appropriate. The application and reason for this
approach includes:

*   the scope of applicability for <u>television</u> <u>operations</u>
     <u>enhancement</u> is limited in the number of potential instances
     <u>relative</u> to other applications;

*   the technical requirements for a consumer oriented <u>teletext</u>
     <u>service</u> <u>for</u> <u>Asiatic</u> <u>markets</u> is focused to one or two very
     specific physical and presentation layer problems;

*   the principal technical requirements for teletext based
     <u>education</u> <u>and</u> <u>training</u> systems are similar to those of the
     <u>business</u> <u>information</u>, software publishing and consumer
     catalogue shopping applications; and

*   the commercial viability of <u>consumer</u> <u>quality</u> <u>sound</u> <u>(music)</u>
     <u>publishing</u> has been usurped by the advent of the Compact
     <u>disk</u>.

We examine only the salient aspects of the problem and
opportunity, and the technical requirements for each of these
applications.

8.1. Television Operations Enhancement

By the term TELEVISION OPERATIONS ENHANCEMENT we refer to the
improvement of the communication of status and control
information that may be sent on a broadcast or cable network(s).

8.1.1. Problem & Opportunity

Broadcast and cable operators must communicate status and control
information from national to regional to local stations as part
of their normal operations. Although the communication could be
both forward and backward, the predominant flow is downward.
There also exists a requirement for positive confirmation of the
receipt (and perhaps action) of the control information to the
issuing node.

Some of these functions include advertising verification,
television program source identification, remote television plant
control, internal data services, and audience research (although
this is usually performed by independent groups).

Current techniques include the use of leased private telephone and packet switched networks as well as arbitrarily coded messages delivered over the broadcast or cable network.

These approaches are expensive either in direct communication costs or potentially, in the case of network delivery, of valuable VBI communication space that is inefficiently used and driven by specialized non-universal equipments.

Teletext presents an attractive and viable alternative in several respects:

*   the NABTS protocol has built in features that are readily applicable to network communication needs;

*   the delivery and reception plant equipments used are virtually identical and in fact can be shared with those for consumer teletext services, resulting in reduced capital and operational costs; and

*   more importantly, the valuable VBI channel space is used only on a demand prioritized basis.

8.1.2. Technical Requirements

The principal technical requirements in this application may be summarized as:

*   low error rate of received and forward error protected messages;

*   confirmation of receipt or execution of delivered data or command; and

*   reduced capital, operational and opportunity cost relative to current approaches.

8.2. Consumer Teletext For Asiatic Markets

By CONSUMER TELETEXT FOR ASIATIC MARKETS we mean a service similar to the North American teletext services such as that of CBS, NBC (temporarily on hold) and CBC (moth-balled for now).

8.2.1. Problem & Opportunity

Many, if not all of the Asiatic countries have expressed a keen interest in obtaining an NABTS like teletext service for their country. Much of the technology developed and used in the North American situation is directly applicable to these markets.

However there are some technical obstacles to overcome. These
include:

* accomodation of television signals that are not NTSC based
  such as the PAL and SECAM 625 standards;

* the optimal use of the PAL and SECAM channel capacity in
  consideration of the higher (relative to NTSC) bandwidth
  available;

* the accomodation of correct aspect ratio for NAPLPS data
  created in North America for display on PAL and SECAM
  television receivers;

* the provision in text/picture preparation systems and in
  decoders (perhaps delivery systems) of the text font sets of
  many of the Asiatic countries, such that the large font set
  (some cases), fine structure, and decoding cost and
  performance are all retained and comparable to North
  American technology.

8.2.2. Technical Requirements

The technical requirements that will have to be addressed
include:

* the adaptation of NTSC based 5.7 megabit teletext delivery
  and reception technology with minimal disruption to PAL and
  SECAM systems with a maximum of channel usage efficiency and
  a minimum of system re-engineering;

* the definition and cost effective decoder implementation of
  extended font sets as defined in an extended presentation
  layer protocol to accomodate up to several thousand special
  characters with complex and subtle font definition
  (Japanese, Arabic etc.);

* the accomodation of the aspect ratio differences in PAL and
  SECAM compared to NTSC for decoder display on television
  sets; and

* the adaptation of text/picture creation systems and teletext
  management systems to the foreign text font sets.

8.3. Education & Training

The use of teletext for EDUCATION AND TRAINING refers to the
process of preparation, organization, distribution, update,
and receipt of student performance feedback based on NABTS
teletext delivery where practical.

8.3.1. Problem & Opportunity

The world of education and training has discovered computers, videodisks, voice and sound synthesis, NAPLPS and so on. Even centralized systems such as Control Data's Plato have taken steps to transport many of their training packages to personal computers.

The technology exists, the need exists. But there is a problem which relates to software publishing and experimentation with the new medium and technology. No central focus exists for the organization, dissemination and accumulation of critical feedback to improve the lesson-ware.

The opportunity is with the use of teletext for lesson-ware delivery to user terminals ranging from NABTS FSS decoders through IBM or other popular and relatively standard personal computers.

8.3.2. Technical Requirements

The technical requirements associated with the teletext delivery of lesson-ware for education and training are similar to those for software publishing (as discussed elsewhere in this study).

Only the issue of classification and standardization of terminal and computer configurations need be addressed. However because these are issues not related to teletext delivery, but rather to terminal configuration they will not be addressed here.

8.4. Quality Sound Publishing

The term QUALITY SOUND PUBLISHING refers to the application involving the distribution, rental or sale of digitally coded sound, mostly music, products to the home consumer.

8.4.1. Problem & Opportunity

The recording industry publishers is plagued with two major problems:

*   piracy through the copy of recordings (disk and tape) onto tape for re-sale without the payment of royalties; and

*   assessment of the potential market demand for new recording releases so that production would be ahead of demand if required or that excessive inventories were not built up.

In the early 80's serious consideration was given to the concept of transmitting on a full television channel up to 16 simulataneous high quality fully digitally encoded music channels. The music (mostly) services would be received on a

specially designed receiver-adapter which was armed to accept
services to which the home consumer had subscribed. The user-
listener could chose to listen, record or do whatever with the
signal.

Recently, the advent of the Compact disk has revolutionized the
approaches used in the recording and publishing industry. Not
only has the listener been given uncompromising quality at the
right price, but record publishers have sourcing and royalty
control because of the difficulty and expense associated with the
Compact disk reproduction.

Another recent phenomenon is that of rock and music video
delivered on television. It has taken a prominent position in
the music industry.

In consideration of these facts, together with the inefficient
bandwidth employment associated with the delivery, we consider
the delivery of sound products over the television broadcast and
cable network in a manner compatible with NABTS teletext to be
untenable. For this reason we don not pursue the matter further.

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9. TECHNICAL REQUIREMENTS CONSOLIDATION

9.1. Objective

The objective of this study document and in particular this
section, is to distil a set of technical requirements for new
teletext services that cannot be achieved either at all or with
sufficient efficiency using the current definition of NABTS and
the technology based on the current definition.

9.2. Reality

Recognizing that this task is potentially monumental and all
encompassing, leading perhaps to compromises in some situations,
we have used the the following set of guidelines in our approach
to surface those requirements which will be deemed to have
significant impact:

*   only those which have the greatest potential economic impact
        in terms of the possible equipment or operating revenues;

*   only those which have implications of not being met within
        the current umbrella of the NABTS definition and associated
        technology (it is not practical to spend time analysing what
        can be done satisfactorily with the current technology);

*   only those which have a considerable impact on function,
        performance or cost;

*   only those which have a reasonable and practical possibility
        of being implemented within the next two or three years; and

*   the principal emphasis will be in the area of the
        television-teletext system, in particular the possible
        protocol requirements, and user terminal systems or
        receiver-adapters.

The last of these represents the crux of where many of the
requirements and system trade-off sensitivity occurs.

9.3. Consolidated Requirements

Many ways exist to organize the derived technical requirements.
We have chosen to identify the principal categories by which
they may be considered, recognizing that they are not necessarily
independent of each other from a design trade-off point of view
(the next study report in this series). In fact, several of the
requirements may be considered as criteria by which the design
fulfilment of the primary ones may be assessed.

The two main categories for the derived requirements include:

*   error protection mechanisms to ensure that the required
    level of data service or product integrity is available to
    the end-user; and

*   service provider/operator control of terminal of service
    access and data product usage.

The requirements that must be met optimally in meeting those
above are:

*   optimal channel usage in consideration of meeting other
    function and performance needs;

*   optimal terminal design reflecting the compromise between
    function, performance and cost (capitol and operating);

*   new system feature upward compatibility to ensure graceful
    introduction of new services without the disruption (in its
    full generality) of those already existing; and

*   return communication for transaction purposes.

By way of special circumstance are a miscellaneous set of
requirements that are principally related to presentation layer
functionality, or those which are relatively exotic or of
potentially of such low level of usage as to be best relegated to
application layer functionality. A prominent example is
extension to the presentation layer (and perhaps others) for the
definition of Asiatic text fonts.

9.3.1. Error Protection

The reception of data products and services with low or virtually
non-existent error rate is a requirement that threads its way
unmistakably through all applications. What is minimally
acceptable varies according to application. Most of the errors
in the teletext-based services potentially occur in the broadcast
or cable delivery mechanism.

In summary form, the principal error related requirements
include:

*   a low corrected error rate, at the output of the receiver
    adapter prior to any use of the data, ranging from $10E-6$ to
    $10E-11$, and reflecting the nature of the noise structure and
    source;

*   minimal cost in terms of processing power, functionality or
    performance at any point of the system involved with error
    protection;

*   an ability, at the user terminal system, to be able to
    select or have provided a variable level of protection

Some of the considerations which are in fact requirements
include:

*   the efficient transfer of data sets that are fundamentally 8
        bit in structure whilst not burdening receiver adapter costs
        for efficient processing;

*   error protection mechanism efficiency reflecting the types
        of noise expected on broadcast and cable delivery systems
        (this involves a trade-off of FEC schemes (complex to
        process) versus limited cyclic transmission;

*   the ability to provide error protection in a service
        environment which requires end to end non-cyclic
        communication;

*   the ability to ensure that the latency with which data is
        received by the user relative to its insertion into the
        system is optimally controllable; and

*   in the case of Asiatic markets to cost optimally use the PAL
        and SECAM based television distribution networks; and

*   the ability to deliver large quantities of data.

9.3.4. Terminal Design

Achievement of system functionality and performance is heavily
embodied in the capabilities of the user terminal system.
Unfortunately many technically good solutions make the user
terminal system or receiver-adapter prohibitively expensive and
untenable.

Some of the areas affecting terminal costs which are derived from
the general system requirements include:

*   input data caches to improve the appearance of service
        performance;

*   decryption mechanisms including the use of powerful
        algorithms such as DES;

*   error processing with sufficient performance;

*   receiver-adapter and terminal system standardization in some
        hierchical fashion with a span of inclusion ranging from
        "dumb" simple printers, through "traditional teletext
        decoders, to "programmable" systems in their full
     - generality (inclusive of the concept of universal software),
        and the interfaceability of these to the audio, video and
        computer world;

*   the ability to access several services simultaneously on a
        priority basis; and

Technical Requirements Consolidation

* for Asiatic markets to be able to accomodate the necessary text fonts and television standards.

9.3.5. Return Communication

Operation of some applications is predicated on a return communication capability. In some instances, a voice based telephone transaction will suffice. However, often a digital return is required. Principal features of the return communication mechanism requirement include:

* relatively low cost;

* relatively low bandwidth or data rate and size per transaction;

* preferably little or no disruption to normal telephone service; and

* error free communication.

9.3.6. System Upward Compatibility

As these new services are introduced, they will have to co-exist with the teletext plant and receiver-adapter population that may already be in place, and the specifications and standards by which they operate.

In North America, any new application services which require an extension to NABTS should be cleanly and exactly upward compatible with the current definition. To do otherwise will bring chaos and detriment to this fledging industry.

For Asiatic markets, both NABTS teletext decoders and signal plant should be relatively close derivatives of the North American product such that the adaptation is as economical and timely as possible.

9.3.7. Other

Out of this application study an assortment of miscellaneous requirements have been surfaced which are either properly in the domain of the presentation layer protocol or are of a nature so as not to be directly implementable under the NABTS/NAPLPS umbrella. They include:

* Asiatic text fonts;

* sound and voice synthesis, and synchronization with decoded presentation layer text and graphics;

*   video frame (or frame sequence) delivery, capture and
        display to supplement catalogue shopping, and education and
        training applications; and

*   the standardization of hardware and software environments
        for the execution of small (and presumably relatively large)
        application software in the user terminal environment.

                                ****

Customer _____

Model _____

Serial Number _____