INTERACTIVE SYSTEM FOR ENABLING TV SHOPPING

Field of the Invention

This invention relates to an interactive system for use as a TV shopping system in the home for example.

Background of the Invention

The idea of home shopping is not new per se. In mainstream home shopping, customers have long been able to place orders for goods which are displayed for purchase in printed catalogues. Typically, the customer would telephone or fax the catalogue agent and then order a particular good by citing its respective catalogue number from the catalogue. While the process of ordering goods from the agent by reference to catalogue number is straightforward, it is not well-suited for ordering many types of products, for example, foodstuffs which customers prefer to see and handle first-hand prior to purchase.

More recently, home shopping on the internet has received attention from the big supermarkets. Current trial schemes are testing the most efficient and cost-effective ways of delivering direct to customers who increasingly expect technology to make their lives easier. Tesco has been testing two variations on electronic shopping, namely (1) a catalogue on CD-ROM and (2) a website on the internet where browser-shoppers can compile a shopping list, pay by card and arrange a home delivery at a small cost. Sainsbury has also launched an Orderline service, which takes orders via the internet or by phone or fax, once the shopper has compiled his/her own personal shopping catalogue on a visit to the store. Somerfield and Iceland are also testing similar home-shopping services in their respective stores. Internet shopping is, however, subject to various drawbacks. First, actual usage of the internet is very small, which in part is due to the small proportion of households having

access to the worldwide web. The costs of delivery and administration are high, and the speed of ordering can be slow given that the internet is sometimes sluggish. Further, interested customers have to learn to overcome the technological barriers in getting started on the internet and the likelihood that mistakes are made during the early stages of use is high.

The present invention aims to overcome or substantially reduce at least some of the above-discussed drawbacks.

Objects and Summary of the Invention

It is the principal object of the present invention to provide an interactive system which enables TV shopping to be effected quickly and reliably from a central provider by remote customers in their homes.

In broad terms, the present invention resides in the concept of establishing interactive communication between the remote customers in their homes and particular agents working at workstations at the central provider, and providing to the customers visual representations of the agents and/or of products available for purchase for display on the customers' TVs so as to enable the agents and the customers to effect transactions without the customers having to leave their respective homes.

According to the present invention there is provided an interactive system for enabling TV shopping from a central provider by remote customers, said system comprising: means enabling video and audio communication to be established between the remote customers and the central provider, said means including distribution means enabling (a) incoming customer telephone communications to be routed to particular agent workstations of the central provider, there being a plurality of such workstations, and (b) outgoing audio and video communications from the plurality of agent workstations to be routed to the respective customers from whom the incoming telephone communications are received; means enabling agents working at said workstations to communicate interactively with the customers and provide to the customers video representations of

available products to be viewed on the customers' televisions; and means enabling the agents and the customers to effect transactions.

In accordance with an exemplary embodiment of the invention, the distribution means comprises a control/switching system for enabling customer communications to be routed to and from the agent workstations of the central provider. The control/switching system may be embodied as a piece of software, for example, which is adapted to run on standard computer hardware.

Advantageously, the interactive system may have graphics generating means for enabling computer generated graphics of available products to be provided for transmission to the customers' TVs for viewing.

Further, the interactive system may have signal mixing means for combining video signals generated at the central provider with graphics-generated data, and means for compressing the combined signals for transmission to the customers' TVs.

In the exemplary embodiment, an interface to a broadcast network is provided to effect transmission of the video and audio communications from the central provider to the respective remote customers. The broadcast interface may, for example, comprise an audio feed interface and a video feed interface. The broadcasting can be via any of the established broadcasting media technologies, via, for example, a terrestrial network (including cable or the public switched telephone network) or via satellite directly to the customer's own dish aerial (or via a local area network).

Advantageously, the video representations provided to the remote customers are scrambled and are adapted to be unscrambled by a uniquely addressable decoder device at the respective customers' locations so as to permit the representations to be viewed on the customers' TVs. The decoder device may be a set-top box decoder, for example, and may be integrally connected to the customer's TV.

It is further envisaged that the exemplary embodiment of the invention has additional features for facilitating communication between the agents and the remote customers. For example, the system of the invention may comprise image-capturing means, a camera for example, for providing live representations of the agents and/or of the available products at the central provider. The system may also be provided with (1) means for recording the dialogue of communications between the agents and the customers; (2) means for providing an automated attendant service to the customers when the agents are not available to receive the customer communications; and (3) supervising means for providing a facility for overseeing the configuration and maintenance of said system in use.

The system of the invention advantageously provides a simplified and convenient process for TV shopping by way of interactive communication between remote customers and agents at a central goods and/or services provider. The system can be implemented at reasonable cost and has utility for various applications where the management of customer-agent relationships (for example, managing enquiries) is involved.

The above and further features of the invention are set forth with particularity in the appended claims and will be described hereinafter with reference to the accompanying drawings.

Brief Description of the Drawings

Figure 1 is a schematic block diagram illustrating the system embodying the present invention;

Figure 2 is another schematic block diagram of the system embodying the present invention illustrating the subsystem components of the system in greater detail; and

Figures 3 to 12 are a selection of example process diagrams representative of various functions of the system of the invention in use.

Detailed Description of an Embodiment of the Invention

Figure 1 is a schematic block diagram of the interactive system 1 embodying the present invention. The interactive system generally indicated at 1, comprises a remote customer subsystem 2 at which the remote customer is located, a telephone distribution subsystem 3 connected to the remote customer subsystem 2, a central provider 4 at which particular agent workstations are sited for receiving and processing customer telephone communications, a broadcast distribution subsystem 5 for transmitting live and/or processed communications back to the remote customer subsystem 2 for viewing thereof on the customer's TV, and a control/switching system 6 connected to the central provider 4 such as to enable the customer communications to be controlled and routed to and from the agent workstations of the central provider 4. The control/switching system 6 is preferably an event-driven system comprising a piece of software that runs on standard computer hardware.

Figure 2 of the accompanying drawings shows the subsystem components of the interactive system in greater detail. In this figure, the remote customer subsystem 2 comprises a telephone instrument 7 for enabling incoming customer telephone communications to be effected with the agents 29 at the central provider 4, a television set 8 and a decoder device 9. The television set 8 is adapted to be connected to a broadcast network 28 via the decoder 9. The purpose of the television set 8 is to display visually, at the remote customer location, video representations (live and recorded video, for example) of the agents 29 and/or of products available for purchase at the central provider 4. The decoder 9 has two main functions: (1) it provides a unique address (that is, a number) for identifying uniquely each remote customer location 2 such as to permit unique video representations to be sent from particular agent workstations at the central provider 4 to the respective customers 10 from whom the incoming telephone communications are received, and (2) it is adapted to unscramble the video representations

provided to the customer 10 by converting said representations from an analogue or digital format into a viewing format suitable for display on the customer's television set 8. It is envisaged that the decoder 9 is a set-top box decoder and that this may be integrally connected to the customer's television set 8.

The remote customer subsystem 2 is connected to the telephone distribution subsystem 3 via a public switched telephone network 12. In the preferred embodiment, the telephone distribution subsystem 3 is a computer-controlled automated call distribution system comprising a voice record system 13, a telephone turret 14 enabling audio communications to be effected by an agent 29, an interactive voice response system 15 and a controllable switch system 16, for example a PABX/ACD (Automatic Call Distribution) System, for switching incoming telephone calls to the control/switching system 6. The above-mentioned features of the telephone distribution subsystem 3 are described more fully hereinafter.

The voice record system 13 provides the capability to record optionally the dialogue of telephone communications between the remote customers 10 and the agents at the central provider 4. The voice recorder 13, being preferably connected to the switch system 16, can be used to check (1) the accuracy of product/service orders and (2) the general quality of the products/services being offered for purchase.

The interactive voice response system 15 operates under the control of the control/switching system 6 and its purpose is to provide an automated attendant service to remote customer callers 10 when all agents 29 are busy. Such a system 15 may have means for recording the customer caller's number via CLID (Calling Line Identifier) and means for providing the customer caller with the option to call back when an agent 29 becomes available. Also, such a system 15 may have the facility to (1) permit queuing with promotional voice and video on hold; (2) record product/service order details for later input and confirmation by an agent 29; and (3) permit simple queuing and

provide statistics details therewith (for example, the caller may be told "you are third in the queue, estimated wait time 5 minutes").

The controllable switch system 16 comprises one or more switches adapted to interface between the telephone circuit trunks of the public network service provider 12 and the agents 29, via their headsets, at the central provider 4. The switch system 16 may be supplied as a standard product line item from a third party and typically does not require any modification for use in the system 1 of the invention.

Advantageously, the switch system 16 may comprise a variety of PABX/ACD (Automatic Call Distribution) switches. In order that the control/switching system 6 can be successfully interfaced to switches of this type, it may be necessary to employ a component layer interface wrapper such as to provide a generic interface to the control/switching system 6 and a specific interface to the PABX/ACD switches.

It is also to be appreciated that the switch system 16 performs the following important functions in the system of the invention, in co-operation with the control/switching system 6:

(1) The switch system 16 may signal to the control/switching system 6 that an incoming call is ringing together with its Calling Line Identifier (CLI) if available.

(2) The control/switching system 6 may label a call with One-time Call Reference and then instruct the switch system 16 to route the call to a given extension.

(3) The control/switching system 6 may instruct the switch system 16 to answer the call when given indication by the agent 29.

(4) The control/switching system 6 may instruct the switch system 16 to put a call on hold.

(5) The control/switching system 6 may instruct the switch system 16 to retrieve a call previously put on hold.

(6) The control/switching system 6 may instruct the switch system 16 to route a call to another given extension and answer the call.

(7) The control/switching system 6 may instruct the switch system 16 to conference another extension into any call.

(8) The switch system 16 may signal to the control/switching system 6 that a call previously put on hold has been waiting for the designated period and must now be re-answered.

(9) The control/switching system 6 may instruct the switch system 16 to clear down the call.

(10) The switch system 16 may respond to a system status request to supply system status and any error conditions.

(11) The switch system 16 may respond to a call status request to supply call status, queue position, etc; and any error conditions.

(12) The switch system 16 may be configured to accept an error condition indication from the control/switching system 6.

(13) The control/switching system 6 may request Time of Day from the switch system 16.

(14) The control/switching system 6 may set the Time of Day for the switch system 16.

It is envisaged that the system 1 of the invention may provide a power dialling facility in order that customers who have called the centre and left a Call-back message may be automatically dialled when an agent 29 is free. In that situation, the switch system 16 performs the following additional functions:

(i) the control/switching system 6 may instruct the switch system 16 to call a given Directory Number. The switch system 16 may be configured to respond with the call status/progress: "ringing", "busy", "answered";

(ii) at any point during the calling phase, the control/switching system 6 may instruct the switch system 16 to connect the call to an extension and answer the call;

(iii) the control/switching system 6 may instruct the switch system 16 to clear an extension from a conference call; and

(iv) the switching system 16 may contain a store for keeping record of: the One-time Call Reference (Call Label) for each call, when applicable; the Calling Line Identifier (CLID) for each call, where available; the Status of each call; the System Status; and the response and error condition indications, messages and codes from the control/switching system 6.

Turning now to the central provider 4 of the system 1 of the invention, there is provided a computer-driven user interface and a workflow sales and service process for facilitating searching, retrieval and updating of information about available products/services and customers. More particularly, as shown in the preferred embodiment of Figure 2, the central provider 4 comprises an agent interface system 17, a live video system 18, a first video mixing system 19, a recorded video library system 20, a second video mixing system 21, a video format converter 22, an overlay graphics generating system 23 and a still video library system 24. The above-mentioned features of the central provider 4 are described more fully hereinafter.

The agent interface system 17 preferably comprises a plurality of workstations, in the form of PCs for example, which are so configured to receive incoming customer telephone communications via the control/switching system 6 and to provide also outgoing video and audio communications which can be routed, for example, via the control/switching system 6, to the respective customers at the remote customer locations from whom the incoming telephone communications are received.

Graphic representations of products being offered for purchase can be generated at the central provider 4 by means of software operable under the

control of the agent interface system 17. The software is envisaged to be provided in an overlay graphics generating system 23 connected directly to said interface system 17.

Advantageously, the agent 29 has access to a number of live video sources. Firstly, there is provided a live video system 18, comprising a video camera for example, such that, if required, the remote customer 10 can see live pictures of the agent and/or of available products on the customer TV screen 8. Secondly, there is provided a moving image video library 20 which can be in the form of conventional tape or digitally recorded on a video server. The agent 29 also has access to still pictures from an image video library system 24. The pictures are typically held in digital form.

Further, the central provider 4 has means for selecting and mixing live and recorded video to provide a single video output. For example, the first video mixing system 19 is arranged to combine a live video signal from the live video system 18 with a recorded video signal from the recorded video library system 20, and generate a single video output containing moving images. The second video mixing system 21 has a different function from the first video mixing system 19 in that it is arranged to mix video signals output from the first video mixing system 19 and the video format converter 22, and provide a single synchronised output. In this regard, it is to be understood that the video format converter 22 translates analogue video signals output from the overlay graphics generating system 23 and converts them into a format suitable for mixing with motion video signals.

Advantageously, each of the plurality of agent workstations at the central provider 4 is adapted to provide the following functions in the system 1 of the invention:

(1) Make and/or accept log on/log off requests and change password requests; for example, to initiate requests to the control/switching system 6 to set up video channels for encoded transmission on the broadcasting network 5.

(2) The control/switching system 6 may indicate to a particular workstation that an incoming call, with CLID, is waiting to be answered. Within a given time interval, the particular agent workstation is responsible for responding that the agent 29 wishes to answer the call. The incoming call may also be a call which the agent 29 has put on hold for longer than the permitted period.

(3) Indicate when video is ready for transmission and accept the response from the control/switching system 6 indicating the allocated TV channel number and the ID of the associated feed to the broadcasting network head end 27; also have the ability to specify the ID of the associated feed cable to the head end or allow the control/switching system 6 to select the next available feed.

(4) Indicate the switch status for a local video switch interface 26 in order that the control/switching system 6 can patch the appropriate video source to the feed cable to the head end 27.

(5) Indicate wish to transfer call (voice/video/both) to another agent 29.

(6) Indicate wish to put call (voice/video/both) on hold.

(7) Indicate wish to retrieve call (voice/video/both) previously put on hold.

(8) Indicate wish to terminate call (voice/video/both/immediate/delayed).

(9) Within a given time interval, respond to status request which should supply call status; any error conditions; associated PABX/ACD Director Number (DN); agent status (to include financial value and number of product(s) ordered).

(10) Accept an error condition indication from the control./switching system 6.

(11) Indicate agent operational status; for example, ready to accept calls.

The agent workstations may also be configured to keep record of a variety of parameters, for example:

workstation ID; agent name; agent ID; access level granted; agent status (e.g. not accept calls, engaged, etc); one-time call reference, when applicable; calling line ID (CLID) of caller; time-out period, if applicable; general status (this will include the financial value of product ordered to date); status code; knowledge of the local video switch source 26 and destination port references and video feed IDs; knowledge and interpretation of response and error conditions, messages and codes from the control/switching system 6; and time of day.

Referring next to the broadcast distribution subsystem 5 of the system 1 of the invention, there is provided means enabling video and audio communication signals sourced from the central provider 4 to be switched across a broadcast network for encoded transmission such as to maintain a one-to-one correspondence between the signal source (the central provider 4) and the signal recipient (the remote customer 10). More particularly, in the preferred embodiment of Figure 2 of the accompanying drawings, the broadcast distribution subsystem 5 comprises a switching interface 26, a head end control system 27 adapted to be connected to the switching interface 26 and a broadcast network 28 for enabling communications routed from the central provider 4 and/or the control/switching system 6 to be transmitted to the remote customer location 2. Each of the above-mentioned components of the broadcast distribution subsystem 5 is described more fully hereinafter.

The switching interface 26 provides an automatic means of patching the local video source from the agent workstations 4 to the broadcast network video feed 27. It also provides the facility of transferring video calls between agents 29 without requiring the remote customers 10 to change video channels on their repetitive set-top box decoders 9. The switching interface 26 is envisaged to be provided by a video matrix switch. The switching interface 26 may perform the following tasks:

(1) As instructed by the control/switching system 6, it may connect/disconnect any specified video source to any network video feed.

(2) In user mode it may only allow one source to be patched to one destination. In supervisor mode it may allow one source to be patched to multiple destinations.

(3) In supervisor mode it may permit a reset or disconnect all connections made.

(4) It may accept an error condition indication from the control/switching system 6.

(5) It may directly access motion recorded video signals from the video library system 25 which is envisaged to be connected thereto.

In addition, the switching interface 26 can keep a record of:

video source and destination reference numbers; one-time switch reference per switching instruction; connection and component status; and knowledge and interpretation of response and error conditions, messages and codes from the control/switching system 6.

As is also shown in Figure 2, the outputs from the switching interface 26 are multiplexed together and passed over a wide area network connection to the broadcast network head end control 27. The purpose of the head end control 27 is to demultiplex the received video data and to convert their format, if desired, depending on the type of head end used. The head end is typically analogue, although alternatively, this could be in the form of a digital interface.

Preferably, the head end control 27 comprises (1) a head end subscriber management system/control switch as installed and used by the broadcast network 28 to enable and disable the customer's set-top box decoders 9; and (2) intermediate switching control interfacing components co-located, for example, at the head end.

Advantageously, the head end control 27 can perform a variety of tasks as summarised hereinbelow:

(1) As instructed by the control/switching system 6, it may connect/disconnect any specified video feed (and therefore TV channel number) to a given set-top box.

(2) In operation mode, only it may allow one source to be patched to one destination. In supervisor mode it may allow one source to be patched to multiple destinations.

(3) It may respond to a general status request which should give a general status message indicating the general health of the component.

(4) It may respond to a connection status request which should give a connection status message supplying information of which video source is patched to which video destination and the reference number of the message which instructed the switching with a date-time stamp. If a dedicated interfacing system is used at the head end, these events should be logged to a file.

(5) It may accept an error condition indication from the control/switching system 6.

(6) It may accept a supervisor password change request.

(7) The control/switching system 6 may be able to request time of day from the switching interface 26.

(8) The control/switching system 6 may be able to set the time of day for the switching interface 26.

(9) The control/switching system 6 may be able to manage the head end subscriber management system/control switch log-on process.

(10) It may monitor the system components in operation and have its own simplified logging to a file.

The head end control 27 may also keep a record of parameters such as: system password; current video channel and set-top box IDs; one-time switch reference per switching instruction; connection and component

status; knowledge and interpretation of response and error conditions, messages and codes from the control/switching system 6; and time of day.

With regard to the interaction between the switching interface 26 and the head end control 27, it should also be noted that any one output from the switching interface 26 can be hard-wired to a particular dedicated TV channel (for example, output #1 might feed channel 36, output #2 might feed channel 39 etc). By the application of control signals to the head end subscriber management system, used to enable/disable particular video channels on demand at the customer's set-top box decoder 9, it becomes possible to enable these TV channels at one, and only one, customer set-top box decoder 9.

The broadcast network 28 comprises an interface which, for example, may be provided by a terrestrial service provider (such as Cable TV) or by a satellite service provider. The interface preferably comprises an audio feed interface and a video feed interface. Typically, video signals are delivered to the network in ATM format, or in individual channelised feeds compressed to the MPEG2 standard, or in compressed composite video format. Audio signals are envisaged to be delivered to the network in ATM format, or in separate audio channelised format, or in audio/composite video mixed format. Audio feed can, therefore be provided alongside video through the use of independent transmission paths for voice and video in the system 1. This confers a definite advantage in that the effect of transmission delays to the remote customer location 2 is minimised.

To avoid unnecessary repetition, it should finally be noted from Figure 2 that the control/switching system 6 performs a variety of key functions in co-operation with the other components 3 to 5 when the system 1 of the invention is in use; for example, the control/switching system 6 can look for messages telling it that it has incoming telephone calls from remote customers, and can route those customer calls out to agents working at particular workstations in the central provider 4, and can handle particular

requests, for example, to put those calls on hold or transfer them to other agents or a supervisor. It can also make requests into the broadcast system 5 in order to set up video channels and to tear them down on completion of an interactive agent-customer communication session. It can also perform supervisory functions so as to provide general and specific management information about the system in use.

Additional facilities may also be provided by the system 1 of the invention. The central provider 4 may, for example, provide a database adapted to store and retrieve information associated with the operation and maintenance of the system 1. Typically, the information to be stored divides into four groups, namely: (1) parameters for configuration and operation of system, for example, action to take on various failure events ("static data"); (2) semi-permanent information, such as names of operators signed on, call status etc. ("dynamic data"); (3) decision criteria for incoming call distribution ("call routing data"); and (4) audit log for maintaining a history of all calls, callers and significant events ("audit data"). For completeness, Tables 1 to 4, presented hereinbelow, provide some parameter listings corresponding to the above-mentioned four categories of data, all of which can be stored securely and reliably in the database facility.

Table 1

Videocentre Static Parameters
1. List of Agent Workstations, IDs and TCP/IP Addresses
2. List of valid Agent Names and IDs with Agent Grouping and the services provided by the groups
3. List of valid PABX/ACD Directory Numbers for extensions and trunks and type of event monitoring to be applied
4. 4.Time-out Periods to use for each message type
5. 5.Actions to take on receiving failure indication per component and per call status

Table 2

Videocentre Dynamic Parameters
1. General System Status
2. System Status of individual Videocentre components
3. Call Status of all calls in progress
4. List of Agent Names and IDs currently logged on

Table 3

Videocentre Call Routing Parameters
1. List of CLIs with associated, prioritised Agent IDs
2. List of CLIs with Normal Service Provided
3. List of CLIs for which no stats are to be recorded either for Agent IDs and/or Normal Service provided
Note that the Call Routing will also make use of the following Dynamic Parameters:
1. List of Agent Names and IDs currently logged on
2. Call Status of all calls in progress

Note: The call routing actions are subject to operational requirements. These vary from routing the call to the agent that has had the longest idle time, to complex algorithms based on the incoming callers ID (CLID), time of day, shopping history, available agent base, etc.

Table 4

Audit Log
1. Each entry will be fully Date-time stamped 2. Call Status: for each change in call status there will be an entry which shows the call status as: "Ringing/ Pre-Order/ Order/ Delivery/ Wrap-up/ Post-order/ etc" and with this the "One-time Call Reference" and any associated valid information: "Workstation ID"; "Extension and Trunk DNs"; "Agent Name and ID"; "Error Messages and Codes" 3. Agent Status Change: "Agent Name and ID"; "Logging ON/OFF"; "Shop/Chat/Ready/Not-ready/etc." 4. Component Status Change: "Initialising/Ready/Fault/Closing-down/etc"; "Error/Status Message and Code" 5. System Status Change: "Initialising/Ready/Fault/Closing-down/etc"; "Error/Status Message and Code" 6. All Videocentre Supervisor actions taken from log-in to log-out, including transfer into and out of agent, call-handling mode

The central provider 4 or the control/switching system 6 may also provide a supervisor facility for overseeing and managing the configuration, maintenance and installation functions of the system 1 of the invention. The term "supervisor" is used generically here, and it is envisaged that there are various levels of security access provided by the facility with various associated passwords; for example, the supervisor facility may have separate passwords associated with the system's configuration/maintenance/installation functions.

The supervisor facility hardware is envisaged to be as for an agent workstation (including PABX/ACD headset), so that not only can the supervisor listen in on calls, but also can act as a supplementary agent as required. The converse is also true; with the correct software installed, a supervisor would be able to log in at any agent workstation as required. The supervisor would be able to toggle between the two modes by simply clicking on appropriate buttons or clicking within a given window.

From the workstation, the supervisor will be able to oversee and manage the system components. The screens provided will give warnings of error conditions as well as current statistics: calls in progress and their various stages: "shop/chat/ready/not-ready"; calls waiting, if appropriate; and "total value taken" either per item or per order.

The supervisor facility may have a direct link to access the data within the above disclosed database. The supervisor workstation may be able to request each call's status (refer to the dynamic parameters previously discussed) in order to make short term decisions, such as: listen in on call; operate as an agent to clear back-log of calls; etc. The supervisor workstation may also be able to generate reports from the videocentre audit log (see previous discussion) in order to make long term decisions: staffing levels; duty rosters; agent groupings; etc.

A summary of the respective functions provided by the supervisor facility is given hereinbelow:

(1) Get/set time of day for any system component.

(2) Request status of any individual or all system components directly. Although this is also available from the dynamic data stored within the database to which the supervisor has direct access, it is considered important to provide this direct link for resilience.

(3) Adjust switch settings of the switching interface 26, either for maintenance purposes or to "listen in" to a video channel on an appropriate monitor for agent supervision purposes.

(4) Adjust switch settings of the head end control 27.

(5) Configure and operate the voice recorder 13 remotely.

(6) Configure and operate the interactive voice response system 13 remotely.

(7) Request/cancel listen in to a particular agent 29.

(8) Notify the supervisor of system security violations.

In addition to a general knowledge of the system 1, its components and the various status and error message possibilities, the supervisor facility may need to keep a record of, inter alia.

system component references; knowledge and interpretation of response and error conditions; messages and codes from the system; and time of day.

The system 1 of the invention can also advantageously provide shop operating statistics and broadcast network infrastructure statistics, in use. The below Table (that is, Table 5) shows a typical listing of such statistics, for a particular cable node area, generated by a statistics model of the system 1.

Table 5

CABLE INFRASTRUCTURE STATISTICS	Value	Value	Value	Value
Cable Areas:	Area A	Multi Area	Multi Area	Multi Area
Homes Passed:	220000	450000	450000	750000
% Users Shopping:	5%	5%	8%	8%
No. of 500 Home Nodes:	440	900	900	1500
Max Active Number of Channels Per Node:	0.18	0.18	0.28	0.29
Channel Allocations Required Per Node:	2	2	3	3

SAMPLE GROCERY SHOP OPERATING STATISTICS	Value Year 1	Value Year 2	Value Year 3	Value Year 4
Home Shop Store Customer Base	11000	22500	36000	60000
No. of Customers in Each Week	9607	19650	31440	52400
Max No. of Operators	80	159	253	439
Av No. of Operators	25	47	71	118
Maximum No. of Calls in Busy Hour	347	711	1137	1976
Grade of Service	2%	2%	2%	2%

The model provides statistical information on, for example, (1) the maximum number of simultaneous users of the system; (2) the average number of simultaneous users of the system during operating hours of the shop; (3) the number of TV broadcasts set up (and cleared down) during operating hours of the shop; (4) the probability that a particular channel or agent will not be available when the customer (shopper) calls to the shop; (6) the maximum number of active channels per node to provide information on the number of shoppers simultaneously using the service within each geographic node area, and (7) the channel allocation required per node to ensure that a channel is available in a geographic node area when the shopper wishes to shop.

In operation of the thus described system 1 of the invention, in the context of TV shopping in the home, it will be understood that effecting a successful shopping transaction between a customer and an agent (the product/services provider) typically involves the following steps, namely: (1) the customer calls a telephone number, associated with the system 1, from a remote customer location (his/her home, for example); (2) the telephone call is routed using ACD (Automatic Call Distribution) based equipment to an available agent; (3) the agent identifies (using validation codes etc.) the customer caller and instructs the caller to select a particular TV channel number on the customer TV set; (4) the customer is provided with a picture of the "home shop" (including an inset live picture of the agent) on the TV screen - this is, typically, achieved by equipping the agent position at the central provider with a camera, mixing the video signal with computer generated graphics, compressing the image to MPEG2 standards (typically) and providing the signal to a head end (with appropriate consumer identification information) for transmission across a broadcasting network (a CATV network, for example); (5) the customer visually inspects the available products on the TV screen and then, if appropriate, shops by speaking direct over the telephone to the agent; (6) the customer hangs up the telephone once

the shopping transaction is completed. This final action, on the part of the customer, frees the particular video channel for future use.

Figures 3(a) and 3(b) of the accompanying drawings illustrate schematically the initialisation and closedown process sequences typically for setting up and closing down a TV channel in the system 1 of the invention in use. As shown in Figure 3(a), the control/switching system 6 first communicates with the head end control 27 (in response to a request by an agent, for example) by making a log-on request. In the event that the head end control 27 recognises the log-on sequence such that the request is accepted, the control/switching system 6 can proceed to request the head end 27 to set up a particular TV channel for use. The head end 27 is configured to report the changed status back to the control/switching system 6. In Figure 3(b), the process sequence of Figure 3(a) is shown in reverse order so as to show how an existing TV channel session is closed down.

An agent 29 can readily gain access into the system 1 of the invention by entering a particular log-on sequence with an associated password into the system 1, and Figure 4 shows a corresponding process diagram to accomplish this. As shown in Figure 4, the agent 29 at the central provider 4 makes a log-on request and enters a password into the control/switching system 6, and this system 6 can validate these entries by checking them against sequences stored in the database facility 30. In the event that the agent's log-on sequence matches a particular sequence in the database 30, the control/switching system 6 is able to respond positively to the agent 29 by way of accepting the log-on request , and the agent is then enabled by the system 1 to receive a customer call. If desired, the agent 29 is able to change his/her own password provided that the database 30 can validate the agent's identity in a manner as discussed above. As shown, the control/switching system 6 may also be equipped with a timer in order to prevent the agent 29 from entering into the system, should that agent 29 fail to enter a valid log-on sequence within a prescribed period of time.

Figure 5 of the accompanying drawings is a simple process diagram showing how an audio call connection is typically set up between the remote caller 10 and one of the agents 29 at the central provider 4. As shown in the figure, the remote caller 10 initially dials up the system's telephone number. The resultant telephone call is received by the switching system 16 (for example, a PABX/ACD switch) which routes the call, typically, to the control/switching system 6. The control/switching system 6 may then (a) route the call to the database facility 30 for call labelling/validation purposes and (b) alert one of the agents 29 at the central provider 4 that it has received an incoming customer telephone communication. One of said agents 29, if available, is accordingly enabled to respond to the customer call and identify the customer caller 10 if unknown.

Figure 6 of the accompanying drawings shows a similar process diagram to that of Figure 5, the difference here being that the control/switching system 6 is adapted to re-route the customer call from one agent (agent 1) to another agent (agent 2) should the first agent (agent 1) not be able to respond to the customer call (on account of an error condition, for example). Figure 6 uses the same reference numerals as were used to designate same/like parts in the description of Figure 5.

Figure 7 of the accompanying drawings is a process diagram showing how a video path for a particular television channel using CLI (Calling Line Identifier) is set up in the system 1 of the invention. For the avoidance of repetition, it should merely be noted that a request is effectively made to the control/switching system 6 to set up a video path for a TV channel and to communicate with the head end control 27 in order to request the channel. A response is then expected on the TV channel that has been allocated for the particular session. Further, as shown in the figure, the agent 29 is enabled to tell the customer what channel the television picture will be available on, because the control/switching system 6, by co-operating with the database 30, matches the identifier of the customer caller 10 using the caller's telephone

number with a set-top box identifier (typically) so as to route video through to the respective customer box. This figure again uses the same reference numerals as were used to designate some/like parts in the description of the previous figures.

Figure 8 of the accompanying drawings is another process diagram showing how a video path for a TV channel can be set up in the system 1 of the invention, but without using CLID (Calling Line Identifier). The process sequence, as shown in the Figure, is initiated from the agent side 29 who makes a request to the system to set up a video path. In response to that request, the control/switching system 6 is enabled to communicate with the head end control 27, the switching interface 26 (a local video switch, for example), and the database 30, in a manner as previously discussed, such as to permit video (live video, for example) to be routed through to the customer box. Figure 8 again employs the same reference numerals as were used to designate same/like parts in the description of the previous figures.

As discussed previously, the system 1 of the invention may provide a "supervisor" facility for monitoring agents 29 working at particular agent workstations at the central provider 4, and Figure 9 of the accompanying drawings shows an example process diagram to accomplish this. As shown in Figure 9, the process sequence is initiated by the "supervisor" 31 which makes a request to the system to monitor, for example, a particular agent 29 at one of the agent workstations. Accordingly, in response to that request, the control/switching system 6 is adapted to communicate with the database 30 (for identity validation of the "supervisor") and also to re-route control signals to the switching interface 26 and the switch system 16, respectively. In the event that the request made is validated the "supervisor" is enabled to perform its monitoring function.

As discussed previously, the system 1 of the invention can handle requests, for example, from agents to (a) put incoming customer calls on hold or (b) to transfer the incoming customer calls to other agents or a supervisor,

and Figures 10(a) and 10(b) of the accompanying drawings show example process diagrams to achieve functions such as these.

In Figure 10(a), the agent 29 makes a "call on hold" request to the system in response to which the control/switching system 6 re-routes video and audio signals on hold to the database facility 30 and to the switch system 16, respectively. The remote customer caller 10 is typically requested to "please hold" and thereafter, within a prescribed period of time, the same agent 29 can make a request to retrieve said video and audio signals on hold to enable their subsequent transmission to the caller 10.

In Figure 10(b), a first agent (agent 1) makes a "call on hold" request to the system in response to which the control/switching system 6 re-routes video and audio signals on hold to the database facility 30 and to the switch system 16. The remote customer caller 10 is typically requested to "please hold" and thereafter, once a prescribed period of time has elapsed, the control/switching system 6 re-routes (that is, transfers) the customer call from the first agent (agent 1) to a second available agent (agent 2). The first agent is disconnected from the head end feed of the system and the second agent is enabled to establish video and audio communications with the caller 10. The system may, as shown, provide an apology to the caller 10 for keeping him/her on hold beyond a prescribed period of time.

It is to be noted again that Figures 10(a) and 10(b) use the same reference numerals as were used to designate same/like parts in the description of the previous figures.

Figure 11 of the accompanying drawings is an example process diagram showing the closedown of video and audio paths in the system 1 of the invention, after a shopping transaction is completed. As shown, the process sequence is started when the customer caller 10 hangs up the telephone. This action triggers the agent subsystem 4 to transmit a "hang up" control signal to the control/switching system 6, which in response thereto, re-routes control signals to the other shown system components 16,26,27,30

such as to effect closedown of all existing video and audio paths, and thereby ensure that all TV channels are freed for future use.

Figures 12(a) and 12(b) of the accompanying drawings are example process diagrams showing how the various system components communicate with each other when there is (a) TV session network error recovery and (b) TV session network error failure.

In Figure 12(a), the control/switching system 6 is arranged to communicate with the head end control 27, the database facility 30, and the agent subsystem 4, and to detect typically a TV channel error condition associated with broadcast network node failure. Further, the system as shown is envisaged to possess recovery means for rectifying the detected error condition such as to permit the agent 29 to effect successful (error-free) transmission of video pictures on a particular TV channel across the network.

In Figure 12(b), the control/switching system 6 is arranged to communicate with the head end control 27, the database facility 30, the switch system 16, and the agent subsystem 4, and as in Figure 12(a), to detect any TV channel error conditions etc. In the event that an error is detected and that the system fails to rectify the detected error condition, an error notification can typically be passed to the agent 29 and also, an apology for the detected error in picture transmission across the network from the agent 29 to the caller 10 can be made (with, if appropriate, a request to the caller 10 to call back the agent later on).

Having thus described the invention by reference to an exemplary embodiment, it is to be well understood that the embodiment in question is exemplary only and that modifications and variations as will occur to those possessed of the appropriate knowledge and skills may be made without departure from the spirit and scope of the invention as set forth in the appended claims and equivalents thereof. For example, the system of the invention in use is not limited exclusively to TV shopping in the home. The system in use may encompass more generally the management of

customer-supplier relationships (such as handling enquiries) using, for example, a combination of conventional telephoning combined with video media over broadcast services. In addition, it is envisaged that the remote customer subsystem may be provided with an on-screen menu facility having activating means (a button, for example) such that, upon activation of the activating means by a remote customer, signals can be transmitted from the remote customer location to the central provider of the system, and thereafter, calls can be transmitted back to the respective customer from the central provider on a designated telephone number. In this way, audio communications can be successfully established between the remote customers and the central provider of the system embodying the invention.

CLAIMS:

1. An interactive system for enabling TV shopping from a central provider by remote customers, said system comprising:

means enabling video and audio communication to be established between the remote customers and the central provider, said means including distribution means enabling (a) incoming customer telephone communications to be routed to particular agent workstations of the central provider, there being a plurality of such workstations, and (b) outgoing audio and video communications from the plurality of agent workstations to be routed to the respective customers from whom the incoming telephone communications are received;

means enabling agents working at said workstations to communicate interactively with the customers and provide to the customers video representations of available products to be viewed on the customers' televisions; and

means enabling the agents and the customers to effect transactions.

2. An interactive system as claimed in claim 1, wherein said distribution means comprises a control/switching system for enabling said customer communications to be routed to and from said agent workstations of the central provider.

3. An interactive system as claimed in claim 1 or 2, wherein said means providing video representations of available products comprises graphics generating means.

4. An interactive system as claimed in claim 1 or 2 or 3, wherein said means providing video representations of available products comprises signal mixing means for combining video signals generated at the central provider

with graphics generated data and means for compressing the combined signals for transmission to the customers.

5. An interactive system as claimed in any preceding claim, wherein said means enabling agents to communicate interactively with the customers comprises a broadcast interface.

6. An interactive system as claimed in claim 5, wherein said broadcast interface comprises a video feed interface.

7. An interactive system as claimed in claim 5 or 6, wherein said broadcast interface comprises an audio feed interface.

8. An interactive system as claimed in any preceding claim, wherein the video representations provided to the customers are scrambled and are adapted to be unscrambled by a decoder at the respective customers' locations so as to permit said representations to be viewed on said customers' televisions.

9. An interactive system as claimed in claim 8, wherein the video representations are arranged to be viewed on a preselected channel of the customer's TV upon communication to the customer of the respective channel number by one of said agents.

10. An interactive system as claimed in claim 8 or 9, wherein the decoder and the customer's TV are integrally connected.

11. An interactive system as claimed in any preceding claim, further comprising means for recording the dialogue of interactive communications between the agents and the customers.

12. An interactive system as claimed in any preceding claim, further comprising means for providing an automated attendant service to the customers when the agents are busy.

13. An interactive system as claimed in claim 12, wherein said means is an interactive voice responding system.

14. An interactive system as claimed in any preceding claim, further comprising image-capturing means for providing live representations of said agents and/or of said available products at the central provider.

15. An interactive system as claimed in claim 14, wherein said image-capturing means comprises a camera.

16. An interactive system as claimed in any preceding claim, further comprising means for storing data in analogue and/or digital form.

17. An interactive system as claimed in claim 16, wherein said data storing means comprises a video library system.

18. An interactive system as claimed in any preceding claim, further comprising supervising means for providing a facility for overseeing the configuration and maintenance of said system in use.

19. An interactive system substantially as herein described with reference to the accompanying drawings.

