Believable Broadband for Businesses: 5 Scenarios

by Robert Johansen
and Paul Saffo

Columbia Institute for Tele-Information
Graduate School of Business
Columbia University
809 Uris Hall
New York, NY 10027
(212)854-4222

BELIEVABLE BROADBAND FOR BUSINESSES: 5 SCENARIOS

Paul Saffo and Robert Johansen

Draft Copy. August, 1988. Research Working Paper Series.

Center for Telecommunications and Information Studies. 809 Uris Hall
Graduate School of Business. Columbia University. NY, NY 10027
(212) 854-4222

DRAFT

August 15, 1988

BELIEVABLE BROADBAND FOR BUSINESSES:

Five Scenarios*

Paul Saffo and Robert Johansen

Institute for the Future

Menlo Park, California

Many people have discussed the future of broadband use in business, but most of these discussions have focused on the technology, rather than the users. In this paper, we describe a set of what we feel are believable scenarios for broadband use in business. Our goal is to spell out some practical situations where broadband could make a difference and could deliver enough value to be worth a premium price. (One of our assumptions is that broadband services will continue to be considerably more expensive than narrowband.)

We are focusing on services that would be delivered at the low end of what is normally referred to as broadband. The term "broadband" today generally refers to networks that will operate at 135 Mbps or higher. Such bandwidth offers impressive functional potential: it could carry broadcast quality TV in real time without digital compression, for example. Our scenarios describe applications that do not require such bandwidth, although some will require full broadband on demand in certain situations. Our assumption is that users will economize on bandwidth for the foreseeable future and that applications such as those described in these scenarios will be important stepping stones toward true broadband applications in the future.

These scenarios were developed by a small team of researchers at Institute for the Future (IFTF), working with input from several outside experts as well. IFTF has been active in pilot testing various new information systems over the last 20 years, as well as in evaluating user needs for emerging information technologies. Our goal here was to take a user's view of broadband. Why would users want to use such systems? What would they use broadband for? What would they be willing to pay for?

---

* The authors would like to thank Martin Elton for his extremely helpful comments on two earlier drafts of this paper.

For each of the scenarios, we provide a bit of background, a description of the broadband functionalities that are included, a narrative summary of the scenario, a description of target users, and a highlighted list of compelling needs that would attract prospective users to such an application. In the course of preparing this paper, we have generated a total of 15 draft scenarios. For this paper, we have reduced the list to five by selecting those applications that that provide a taste of the complete set and are illustrative of what we see as a range of promising applications. Following the five scenarios, we include a set of implications and conclusions drawn from our explorations.

Scenario 1: "Transtrack"

Background:

Transtrack is a two-way security system. It is tailored for use either by large corporations operating private security systems that monitor large dispersed installations or by security service companies seeking to offer improved services to their customers. The key market needs satisfied are the reduction of false alarms (currently, over 99% of all alarms are false) and an accelerated identification and response to actual emergencies. The scenario could feature settings such as: a private security force of a large corporation (an oil company or aircraft company are good candidates, as both have widely dispersed equipment sites that are hard to monitor), a private security firm (monitoring numerous sites of different clients), or an industrial setting where mechanical equipment at numerous sites is monitored.

SecureCo is a contract security company in Silicon Valley. Its customers are small and mid-sized high technology businesses with substantial security needs; many are government contractors and must meet Defense Department standards, while others are worried about hardware pilferage and industrial spying.

Functions Demonstrated:

The key to SecureCo's service is a packet-switched ISDN link. Installed in various locations at the clients' sites are video cameras, microphones and speakers, as well as security alarm hardware. This equipment is constantly sending back sensor telemetry to the center in response to system polls. The alarm sensors ("traps" in alarm industry slang) respond with "system secure" signals every thirty seconds. The microphones are on constantly, and a five-minute sample of microphone input is constantly being saved as digitized audio in the central alarm unit at the customer's site; if an alarm is triggered, the latest sound bite saved is immediately transmitted to the SecureCo monitoring station for playback by the monitoring guard in order to determine the cause of the alarm. The video cameras also are constantly running, also recording a five-minute video sequence (stored locally in the alarm control unit), and transmitting still frame video at regular intervals to the monitor station. SecureCo's computer compares the incoming image to the prior image; if there is any difference, the monitoring guard is immediately notified (thus there is constant communications going on in the background), and several things happen automatically: (1)

the central computer immediately polls all sensors at the site and will sustain stepped-up polling rates until ten minutes have passed without additional alarms, and (2) an alert flashes in the guard display, with graphic data indicating site location, layout, and status of all sensors.

The guard has a variety of options open to him. A screen at his desk displays the status of all alarm systems being monitored. In addition, a video monitor displays video stills from sites on a rotating basis. However, when an alarm is triggered, a window on his main monitor screen shows the affected site, and the last video image is displayed on a video monitor. Another window displays a plan of the entire affected site, showing the source and kind of the alarm: entry or fire, perimeter trap, sound detector, interior alarm, or change noted in video image. The system is already opening up bandwidth to the affected site as the guard swivels in his chair, pulling in continuous sound and very short cycle still video (almost like actual action) from a camera and microphone nearest the alarm trap triggered. In addition, the guard can use downstream bandwidth to steer both the camera and the microphone, or switch to several units in sequence, or simultaneously, display the other views on the second monitor at his desk.

A key strength of the system is the cost-effective delivery of data on a constant basis for analysis at the head-end guard station. Because information is delivered in digital form, it can be managed by computers and brought to human attention when an anomaly appears. In addition, the system allows an instantaneous broadening of bandwidth in moments of crisis. (For example, background operations could run at less than T1 bandwidth, while alert operations would shift above T1.)

Scenario:

> Picture a guard at monitor station: the station includes one terminal, a telephone and screen displays of the status of several sites. This is the central operations room of SecureCo, a contract security firm. The need of security firms and their clients is for "bandwidth on demand" to get redundancy in information necessary to avoid false alarms and respond quick-ly to real ones.
>
> A buzzer at the guard's console indicates an alarm and the screen changes to an "alert response" mode. A status window appears on computer monitor screen indicating location where alarm has gone off and additional relevant data such as company contact, emergency response procedures, and so on The video monitor clicks on a still shot of interior of warehouse, and hiss of sound on the speaker by his console is audible.

A message appears on the computer monitor: "Open warehouse door at Microsystems." The video screen springs to life with a vivid still image, quickly followed by steady sequence of stills. In the background, the system is downloading five-minute sound and video bites from the central box at Microsystems. Each has date/time displayed in corner. The computer screen displays graphic layout of plant, with flashing red at open door. Below is a window displaying status (lots of graphics and color) of each sensor on-site ("motion and sound anomalies detected at 23:56").

Suspense builds—what is source of alarm? The video screen paints the image of a human standing by door: "Sorry, I forgot to use my security card when I entered..." The guard zooms in camera and opens two-way audio. It turns out to be the company president, which the guard confirms by calling up a photo database of company employees...The system monitors return to normal scanning/monitoring mode, as guard resets alarm system of Microsystems from monitoring center.

Target Users:

Businesses with needs for monitoring dispersed resources such as widely dispersed mechanical systems are key candidates. Burglar alarm companies are obvious candidates; Transtrack could be used as a platform for their services. Warehousing or trucking firms are also logical, as are industries that operate hazardous operational or storage sites. Oil companies could use Transtrack both to monitor large refinery plants or widely dispersed oil field sites. Many other manufacturing, energy, or utility companies would have needs in this area, as would computer operations in large financial service companies or defense contractors.

Compelling User Needs:

Remote monitoring is a fact of life for many businesses and it is often very expensive. If even a portion of this monitoring could be done electronically, major cost reductions could be achieved. If electronic transactions could be added to such a system, improved service or lowered risks from emergencies could result. Target benefits include: decreased staffing expenses for monitoring and security personnel, improved ability to respond to malfunctions or emergencies (with related cost reductions), lower insurance costs, and reduced liability risks.

Scenario 2: "Audiospace"

Background:

In this scenario, hi-fi binaural audio is used with document scanning and high-speed video still imaging. The scenario situation is a final review of a one-page color glossy advertisement to be placed in a national magazine. The communications link is among several sites at a manufacturing company and the company's advertising agency.

Functionalities Demonstrated:

Hi-fi binaural audio is demonstrated to deliver the illusion of sitting in a virtual "audio space": the voices of the participants come from different directions, as if they were sitting around a conference room table together. Implicit in this application is a network-based audio/graphic/image bridging capability. Document scanning is included, allowing participants to scan in page drafts, drawings, and photographs for immediate (or almost immediate) display at the other site. In addition, it is possible to exchange and manipulate color still images stored in computers of both the manufacturing company and the ad agency. This exchange would include a pointer function and the ability to revise for the others to see (high-resolution screen-sharing).

Scenario:

> The scene opens in an ad agency, with the image of an agency "creative" sitting at a workstation with a Plantronics-type headset on. (Storyboards are on the walls, along with sample products, and generally wild displays ; this agency is used to designing flashy ads and commercials.) The creatives are talking with several other people, who are not present in the same room.
>
> "I just finished what I hope is the final cut at this one-pager. Are you guys there?" Binaural audio is used here as people introduce themselves; each voice seems to be coming from a different part of the room. About six people are on-line: one from corporate advertising; one from product development; one from legal; and the assistant brand manager and the brand manager; plus the creative at the agency. The participants in the meeting go "around the table" informally, each saying a few words of informal introduction as they go. Each voice comes from a distinct direction.

"Take a look at this shot, folks...", the creative says as a color image of the company's product appears on his workstation. Reactions come in via audio: "Wow" "You're getting close now!"...and so on.

A voice comes from the "other side of the table" via binaural: "I get bogged down in this part of the page, Marty..." (Pointer appears on the screen, circling an area of the image containing a line art illustration—that portion is then highlighted on the screen by color shading. Movement on the screen indicates synchronization of screens back and forth.) Discussion of that part of the ad continues briefly, showing both binaural and high-resolution screen-sharing capabilities.

Scene shifts to second workstation. At this point, another voice comes on and the workstation we have been looking at darkens just as the other one lights up. We see the assistant brand manager sitting at her workstation, in another city and in a very different corporate environment. The audience recognizes a voice that they have heard talking earlier via binaural. "I'm concerned that your ad looks an awful lot like the one that Racor (a competitor) just ran in Saturday Review (another magazine). Have you seen that?" When the others say no, the assistant brand manager scans a page from the Saturday Review with a hand-held scanner. The image appears in a window of her workstation, as it appears on those of the others. (Others would indicate that it had arrived and comment on it such as "Oh yeah..." "Not bad..." "They're certainly after the same angle we are" "But it really is different than what Marty has done.") They proceed to discuss the competing ad and its similarities and differences from the current concept.

Scene shifts back to the creative. At this point, the creative is visibly anxious to get this decision resolved. "I think this is it." The proposed single ad image appears on his workstation screen again. A suggestion comes from the binaural audio; it is the brand manager speaking: "Especially when I see what Racor did, I think we might do better to half size the ad. It would be cheaper and I think we'd get an even better effect—providing we can get a good placement in the magazine. Can you try that Marty?" Marty half-sizes the ad on his screen for display on the others.

The Brand Manager comments: "OK Marty, let's go with that one. Scan us your final copy when it's ready." Marty shows great relief.

Target Users:

Target users will be found in dispersed organizations of various sizes that have to collaborate, especially those with tight deadlines to deal with. For the combination of binaural and image, visually-oriented disciplines such as advertising, engineering, architecture, and so on, would be the most likely candidate. This application should cut across industry sectors, but will be more relevant to those with decentralized operations and high visual communication needs. Small businesses with such needs (that could afford it) are likely to be working in specialized technical areas.

Compelling User Needs:

Users have expressed needs for audio (conference calling) links and have problems in the lack of visual cues over audio only. Video is still very expensive, requires special equipment, is quite inflexible (for example, there are a limited number of rooms and standards are still a problem), and only approximates a face-to-face meeting. If additional social presence could be added to conference calling at a reasonable cost, users are likely to respond enthusiastically, especially if strong computer capabilities are also available. Target benefits include: time savings, a quicker response to marketplace changes, improved team morale, improved team coordination (for example, fewer duplications of effort), higher quality end products, lower expenses for travel to face-to-face meetings, and flexibility to adapt to different organizational structures.

Scenario 3: "Virtual Corp"

Background:

Virtual Corp is a cooperative channel system, an electronic link among a group of cooperating manufacturers and their suppliers to provide competitive advantage for all who are involved. It is a virtual corporation (not a real one) since it really does not exist as a separate corporate entity. Rather, it just functions *like* a corporation to purchase items from suppliers and otherwise serve as an agent for the cooperating group. This scenario would probably be told from the perspective of one of the corporate members of Virtual Corp.

Functions Demonstrated:

Implementation of a cooperative channel system does not require broadband; in fact, most cooperative channel systems (for example, those based on EDI) will be narrowband. However, a broadband system could offer enhanced features based around network-based shared distributed processing, with variable bandwidth on demand. In this way, the member companies can share information access and processing capabilities and ensure that these processes are standardized (a major issue in joint bids among different companies). Image sharing is also done within Virtual Corp, allowing members to exchange and modify images that are stored within various parts of the system. Browsing within the network is allowed, so users can search for the best of the available resources for their own particular tasks.

Scenario:

> The scene opens with two workstations simultaneously in use, at two different but very similar physical settings in manufacturing companies, one of which is making a sub-assembly for the other company's primary product. A common task is in progress, involving two people with technical backgrounds discussing a graphics image.
>
> The shared images are being discussed with a voice link (this could be binaural, but does not have to be), and token-passed screen input devices (mouse or the like). One engineer points out the trouble spot on a on-screen diagram of a widget being manufactured; selecting a menu item causes the area of interest to expand to fill the screen.
>
> One engineer notes that they are missing a key component and that he does not have it available. The other concurs about the need and the fact

that he doesn't have it. They enter a request over the network for the component.

Next, one engineer notes another element in the design that is missing. "I'm sure I remember seeing something like that recently. Now where was it?" She shifts into browsing mode, searching inventory banks at a variety of warehouse locations. A series of screen displays appears on her screen; as each new screen appears (graphics and still video images) as she is browsing across large geographic distances. As she browses, emphasis shifts to her workstation.

Just then, the other engineer is getting a response to her request out over the network for the missing component. Someone has it in Liverpool. An image of the component appears on the screen to confirm that it is the correct one. "That's it. I KNEW somebody would have one!"

Final scene reveals that the two engineers actually work for different companies in different places, through the Virtual Corp network. As one participant was heard to say, "Sometimes I forget who I'm really working for!"

Target Users:

Target users are likely to be found in businesses and industries where cooperation is a definite plus, such as aerospace, automobiles, construction, pharmaceuticals, and so on. Project teams would find Virtual Corp attractive, particularly if intercompany teams are assembled to respond to major contracts—such as aerospace.

Compelling User Needs:

Cooperative channel systems in general are attractive where there is no dominant industry leader, but where operational expenses are a major problem. For example, the transportation industry was first to develop a standard for such exchanges. In the automobile industry, EDI standards are being used in order to help U.S. manufacturers lower their costs so they can compete with Japanese companies. Broadband channel systems would have many of the same attractions, but in addition would offer the sorts of functional capabilities described in the scenario: distributed processing, browsing, image sharing, and so on. Target benefits include: reduced operational expenses (through shared computer resources), an increased ability to compete with foreign competition (although some ventures may also involve foreign companies) or other market pressures, an improved ability to respond to contract bids, the possible sharing of human resources within the network, a

reduced risk for each company (since resources are shared across companies), and an improved overall quality of final products produced.

Scenario 4: "Corporate Family"

Background:

In these days of mergers, acquisitions, and globalization of business, there are increased demands for keeping in touch with ever larger numbers of employees. Keeping in touch is always important for the health of a company, but it is critical during crisis periods—such during mergers or following stock market falls. Wideband media offer the potential to provide a strong sense of social presence for large numbers of people, at least some of whom may be geographically separated. Federal Express refers to such applications as "family briefings," allowing a large corporation to maintain a sense of family.

In this scenario, a large manufacturing company is experiencing a crisis period. Its regular "corporate team briefing" (CTB) session takes on new importance during a crisis period.

Functions Demonstrated:

Point-to-multipoint video (what has come to be called Business TV) is the key function demonstrated in this scenario. The company has most of its employees in the same metropolitan area, but some links to other parts of the United States and foreign countries are also involved. Thus, most of the communication takes place over the broadband telephone network, but there could be links to satellite transmission as well. (Most current business TV sessions use satellites, but we see no reason why some applications might not be better suited to fiber links.) In addition to point-to-multipoint video, enhanced audio would also be used over the same network. (Current satellite networks often require parallel telephone bridging.)

Scenario:

> The scene: an executive office. Corporate Team Briefings (CTBs) have evolved into a major link between executives within this manufacturing company and the 10,000 employees. The executive is just preparing for his quarterly CTB.
>
> Scene shifts to a workstation screen, where some people view and participate in the briefing. These people have access to more detailed background materials than do those who are watching in large theaters, creating an incentive for people to participate in the briefings via their workstations.

These people can also ask questions more easily, again through their workstations. An engineer is sitting at her workstation watching the CTB, viewing the presentation, browsing through some of the background information, and asking a question via audio from her workstation. Electronic polling and instant analysis of results are available as needed.

The generally positive view at the last quarterly CTB has been punctured by the publicized loss of a major contract. A major competitor gets the contract and layoffs at the subject company are threatened. Local newspapers carry the story, fueling fears of employee layoffs. The executive calls an impromptu CTB on one day's notice (demonstrating the bandwidth on demand capabilities of this network).

During this CTB, the executive presents a confident view of the future and provides background financials to back it up. Again, the presentation can be seen from any workstation. Each engineer goes on to review some of the background data (including images) in more detail.

The impromptu CTB did not change the fact that they had lost a major contract. But it did squelch the rumors that employees were out looking for other jobs and worrying about the future of their company.

Target Users:

Links to many sites will be important in an application like this. Manufacturing companies are a likely target, with their decentralized operations. (Technically oriented companies could have users who can participate via workstations more readily, rather than simply viewing a video presentation in a theater.) Training applications also are good candidates for a system like the one demonstrated in this scenario. Thus, the target users could vary greatly.

Compelling User Needs:

Decentralized companies have strong needs to maintain a sense of common direction and purpose. There are practical needs for such commonality, such as the necessity to coordinate various efforts and to bring projects in on time and within budget. But there are also important qualitative issues, including the need to humanize executive management and to provide a sense of leadership and team spirit. Target benefits include: improved morale, lower staff turnover rates, improved team performance, lower absenteeism, and more efficient use of executive time.

Scenario 5: "Omniview"

Background:

A key to successful investment is solid analysis based on timely information. Not surprisingly, financial sector firms hire an army of librarians, researchers, and analysts to identify trends in any number of slices—by market, by product, by company, even by country—the combinations are endless. Ever more of the desired information is available electronically, yet access details can make the information effectively unavailable at the moments when analysts and traders need it most.

This scenario describes an analyst's workstation providing access to information on demand from an ever-growing electronic data pool.

Functions Demonstrated:

This analyst's workstation offers access to distributed data, distributed processing, browsing, shared information space, and multimedia features, including audio (voice) and still video.

Scenario:

> The scene is a large investment banking firm. Timely information access is critical—particularly the ability to make connections—to market analysts.
>
> There is a discussion under way: an analyst and a manager talking over a research problem. A market specialist, a vice president, wants to make a major placement in a biotech start-up developing genetically-altered seeds for agriculture. The bottom line to the biotech analyst: will the investment fly? Manager to analyst: "This guy is hot to roll, so we need a report on the table for the investment committee by 9:00 a.m. tomorrow."
>
> The analyst is talking to himself, providing viewers with a running commentary of process.
>
> "Darn. I know I should have begun looking at agribusiness last week. The analyst starts opening windows, displaying a menu of the databases available to him, both internal (for example, a "library" of all research reports written by his department) and external (Dow Jones, Lexis, Nexis, Dialog, and even video clips from network TV captured automatically by a remote server).

He begins with a search for references to the company name, "BioAg." Selecting "new search" from a menu, he types the company name in a dialog box, specifies search parameters (for example, how far back to look), then selects from a menu of databases. His choices: Nexis, Dow Jones, AP Wire, and Dialog. The system automatically dials into the various accounts simultaneously, using network bandwidth. As request results come in, they appear in a "mailbox" window.

The analyst begins scanning information, assembling bits and pieces into different categories he's defined (alternatively, this could be done automatically via agents). These categories will be the framework for his report: company market target, background (including management histories and investor profiles), overall market assessment, potential competitors, and possible partners. A window-based hypermedia structure facilitates this process: the analyst barely needs to type, almost everything is done by clicking and pointing. A nice extra: the system keeps a record of the discovery process that can be replayed backward or forward at high speed.

As he reads, the analyst is also defining new searches on the fly. A reference in one "hit" on company name identifies two senior officers: the analyst posts searches for both, which run in the background as he goes back to reading the mailbox. Soon, a rhythm of inbound messages to the mailbox and outbound requests is set up.

Developing a market sector forecast is tricky. The analyst sends an "agent"—a special program able to identify promising information by use of context and content recognition techniques—off through the library of internal research files. It quickly identifies pieces of several reports offering forecasts of key department sectors such as U.S. agriculture, government support policy, and futures trading activity in potatoes and tobacco, two markets the analyst learned BioAg has targeted.

The report is fleshing out nicely. At this stage, the analyst is beginning to plow back through the data he has captured in each section, moving pieces and writing in commentary. The system automatically creates a "table of authorities" pointing to the sources of each piece of data.

Everything looks good, and the research has narrowed the issues down to one make-or-break question. The information collected so far leads the analyst to conclude the company will probably not fail in any case, but whether it will be a hit depends entirely on the success of one product, a low-tar, low-nicotine tobacco plant. In the past, with a deadline closing, the analyst would have scribbled in his best guess, but the system is easy to use, so he forges on.

The analyst mutters to himself: "Well, it boils down to two questions—how low in harmful qualities can they make the plants and still keep the taste—and what is going to happen in terms of tobacco regulation generally?" He sends off two agents to track down leads.

The agent searching the industry regulation trends returns with a reference to the TV show, "60 Minutes," the analyst notes they did a segment on tobacco firm liability some months before. He requests the clip,

which is downloaded electronically. Viewing the clip, his thoughts crystallize. Noting the large sums the companies are spending to kill the suits, he blurts out: "Gosh! These guys are really scared—if BioAg can deliver, it will be their salvation." He tracks down additional information from Lexis, a legal/regulatory database, to back up his forecast and wraps up the report.

The final scene is of the analyst hitting the "print" button and the report emerges from the printer. Simultaneously, he sends a copy electronically to his manager. The system will allow the manager not only to attach his notes to the report, but also to look at the underlying data with ease. Close with phone conversation between the two. Analyst: "Yeah, the result is a surprise to me. I thought it was a turkey, but the data really support the investment. Look it over tonight—if you have any last minute changes, I can whip 'em out in the morning."

Target Users:

Anywhere when quick access to diverse external information is required, and the value-added of such information is sufficient to justify moderate system costs. Candidates include: consulting firms, management consultants, analysis arms of financial firms, advertising agencies, and corporate librarians.

Compelling User Needs:

Rapid access to multiple external data sources, including information in multiple media formats. The value of information is getting it when you need it and quickly reducing it to useful knowledge. Target benefits include improved ability to respond to rapidly changing market conditions, reduced market risks, increased work per unit of staff time, increased ability to share staff resources across sites (and perhaps reduce personnel expense), and an improved ability to evaluate new business opportunities.

CONCLUSIONS AND IMPLICATIONS

The above scenarios are intended to be illustrative rather than exhaustive; the potential for broadband is clearly larger than five or 15 segments. Yet, we were surprised to discover how few potential applications stood up under close scrutiny. In fact, many applications that seem to require broadband can actually be implemented within the increasingly powerful domain of narrowband media. We expect that most compelling applications of broadband will be found among tasks that cannot be performed at all today. Cost is an issue: we suspect that most of today's "horseless carriage" applications for broadband will not require broadband at all, or will not be worth the likely additional costs.

We conclude that surprises will be likely when searching for believable broadband applications. Successful strategies will be designed to identify and respond to surprises as quickly as possible. Early and frequent pilot testing can do much to aid this process, highlighting, in particular, the corporate infrastructure and organizational support that will be necessary to make broadband business applications practical.

Such scenario-generating exercises can also assist by providing an early, though qualitative, sense of whether user demand is above the threshold necessary to push ahead on major wideband development efforts. Do scenarios arouse user interest? If such scenarios were to come to pass, what business benefits would be likely? What would be the likely implications for the workplace? For the marketplace? In addition, scenarios will provide insights for system designers.