The Advantages of GSA Open Standards:

The Role of S2S and G2S Technology in Efficiency, Innovation and Increased Revenue

Prepared by: Jamie Leonard, MS.

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48377 Fremont Blvd, Suite 117 • Fremont, CA 94538 • Tel: 510.492.4060 • Fax: 510.492.4001 • www.gamingstandards.com

1 Introduction

Imagine a casino floor where games are able to talk to the back-of-the-1house systems, and where the ticketing systems work together with the accounting system, regardless of manufacturer origin. Managers know instantly when a bill validator stops accepting currency, when a game malfunctions, or when an anonymous player has an exceptionally high expected value of play. Managers know that absolutely every machine on the floor is running the software approved and implemented by management, bill validators are instantly updated to accommodate newly released treasury bills, and upgrades are implemented with the simple touch of a button. Welcome to the world of open standards and protocols. Welcome to the world of Game to System™ (G2S) and System to System™ (S2S) implementation.

Academia and the gaming industry media have already recognized the importance of this new technology, citing with accolade the productivity enhancing properties as well as the innovation that such standards represent.

- Best Productivity-Enhancement Technology (Global Gaming Business)
- Top Three International Gaming Products (IGWB)
- Top Three Most Innovative Products (Casino Journal)
- Top 10 Slot Floor Technologies (Casino Enterprise Management)

The Native American gaming industry in the United States has already recognized the importance of this new technology, and S2S has already been implemented in several properties throughout the country.

- Choctaw Casino Durant, Oklahoma[1]
- Seminole Hard Rock Tampa, Florida[2]
- Seminole Hard Rock Hollywood, Florida
- Seminole Casino Brighton, Florida
- Coconut Creek Casino Coconut Creek, Florida
- Seminole Casino Hollywood, Florida
- Seminole Casino Immokalee, Florida
- Seminole Casino Big Cypress, Florida
- Viejas Casino, San Diego, California

[1] Casino City Times article “Choctaw Casino Durant Implements GSA Protocol” March 31, 2006
Available online at www.casinocitytimes.com

[2] Casino Journal article “Leave your ego at the door” 2006
Available online at www.casinojournal.com

Figure 1-1 Seminole Hard Rock, Tampa Florida

Figure 1-2 Seminole Hard Rock Hollywood, Florida

2 Solving the Problems Caused by Proprietary Languages

The Gaming Standards Association developed Game to System (G2S) and System to System (S2S) in order to facilitate increased efficiency with the advent of broadband game technology.

- S2S facilitates system interface, allowing ticketing systems to interface with accounting systems, bill validator systems, player tracking systems etc, regardless of manufacturer origin.
- G2S facilitates game to system interface, allowing all games on a casino floor to interface with back-of-the-house systems regardless of manufacturer origin.

The key to the convenience, value, and ultimately the return on investment provided by the implementation of these open standards is found in the discontinuation of proprietary languages. The contemporary casino floor works because operators have had no choice but to make it work. Player demand for diverse gaming product requires the competitive operator to provide games from several different manufacturers. In turn, this requires operators to mitigate the proprietary language of each manufacturer in several areas that could be more efficiently managed if all systems interfaced through one protocol.

- Machine accounting systems
- Player tracking systems
- Ticketing systems
- Bill validation
- Floor accounting systems
- Game code verification systems
- Specialized application systems
- Data gathering systems

The adoption and implementation of S2S in Class II[3] gaming properties came quickly due to the urgent need to solve a major business problem. In order to provide players with a diverse selection of games, most operators will buy from several vendors. Several different vendor offerings required a central determination server, accounting system, and ticketing system to accommodate the proprietary language of each vendor. Through S2S the following key inefficiencies were removed:

- Manual compilation of several different accounting systems (one for each manufacturer's games present on the floor)
- Non-compatibility between manufacturers of ticket-in ticket-out tickets (a real inconvenience for players)
- And all the problems faced by regular casinos

As is the case in contemporary casinos, Native American operators had no direct access to the raw data recorded by each game. Since each accounting system uses a manufacturer specific proprietary language, floor wide accounting data requires manual compilation. Tickets from games of different manufacturer origin are not recognized by other vendor systems, requiring players to go from game to cashier to game, rather than game to game. This is true in player tracking systems as well. Implementation of S2S in the Class II gaming industry was necessary for operational efficiency, as well as player convenience. The same is true for the rest of the gaming industry.

Specialized applications cost more to develop than can be recovered through their sale, hence very few specialized applications are available to operators for more efficient data analysis. In order to apply specialized applications property wide, an operator would have to buy the same application from each vendor represented on his floor.

There is clear demand for specialized application software. Such applications would not only drive more efficient player tracking, but translate into greater revenues through more efficient marketing. In essence operators are trapped by the proprietary languages on their floor, but manufacturers are also trapped, being unable to achieve potential revenues to be gained through application software. The proprietary language keeps the potential market of the specific application too small to merit research and development. Without proprietary languages, one or several manufacturers can develop competitive applications that will work on any interface due to the implementation of G2S.

[3] Class II gaming represents a sector of the industry (commonly Native American gaming) where slot machine outcomes mimic a bingo draw through a central determination server rather than a random number generator.

3 Open Standards and Innovation

Open standards create markets of innovation and increased choice for consumers. Consider the USB standard, open and available to any company that desires to research, develop and market peripheral technology. The beginning of the USB port saw difficulty in the interface between different manufacturers and peripheral products, much like the current situation with games and accounting systems.

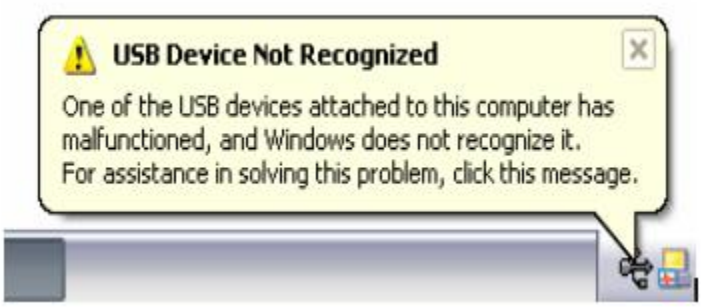

Figure 3-1 Old USB error message

Now that USB standards have been implemented, innovation steers the plug and play (PnP) products market. Less than a decade ago, there were no guarantees that any given USB device would interface correctly. With uniform implementation of the open standard, consumer anxiety has turned to excitement regarding the unique and sometimes awkward products that are available from manufacturers all over the world.

Figure 3-2 USB Heated Gloves[4]

Figure 3-3 USB Mechanical Toothbrush

Figure 3-4 USB Massage Ball

The implementation of S2S and G2S will accomplish the same innovation for specialized applications in the gaming industry as the USB standard accomplished for the PnP market. As illustrated above, open standards drive innovation. Regardless of the seemingly awkward nature of a product, an inventor perceived enough market demand to develop and manufacture that product. Through S2S and G2S, an operator will not only have the ability to request specialized applications, but manufacturers will compete for the operator's

[4] Available at www.raremonoshop.com

business providing different options for the same application. Open standards facilitate choice for consumers, and in this case, the casino operator.

Current casino applications are reminiscent of the video game console industry, with proprietary platforms that force the user to choose from a selection of games. While some games are manufactured for every console, others remain the intellectual property of a specific console manufacturer and are unavailable in any other format.

While not every child can afford the luxury of each console to play every game, the casino operator must invest comparably in order to provide selection to players. This specialization in licensing forces operators to mitigate the difficulties of proprietary languages in order to remain competitive. The challenges regarding availability of data for analysis, signifies that proprietary languages obstruct potential revenue. Through open standards, both operators and manufacturers reap the benefit of specialized marketing and analysis as well as increased market size for new applications respectively.

4 Real time data access

Currently, operators do not have direct access to the data recorded on the floor by each game. This data is provided through an operator's slot floor management company. While this system of operation has been the industry standard to date, with the implementation of open standards, operators will have direct access to their own data.

Several industries, including retail and insurance, make use of specialized econometric regression analysis in order to learn about consumers. While several casinos currently employ player tracking and data analysis, through the implementation of G2S and S2S, truly unified player tracking and data analysis with respect to the whole casino floor is possible in real time.

While the open standards will drive innovation for application software, they will also facilitate more efficient slot floor management through real time access to operations and raw data, as well as event notification. Through event notification the operator will be sent a message every time a specific event occurs. For example, the operator can subscribe to any event of interest that may take place on the gaming floor. If a high value player is not a member of the player's club, the manager now has the ability to send guest services to invite the player to join.

5 Broadband Upgrade Advantages

GSA standards are open and therefore the cost of G2S and S2S implementation is largely represented in the upgrade of the slot floor to broadband capability. This upgrade, however, will become necessary in the future as operators desire to remain competitive within the gaming market.

Broadband and downloadable games are the future of the gaming market. Within the next five years the move towards more advanced gaming systems and interfaces will see the obsolescence of current game systems. In the future, the operator without a broadband floor will be akin to the consumer still using DOS a decade ago, with all new games and applications incompatible with his system. In a competitive industry, it will be difficult to remain a competitive property with antiquated offerings.

Through broadband and open standards, players interface will change dramatically with access to live streaming sports or news during game play, iPod interface, special offer marketing and linked online competitive play. The first operators to implement broadband and open standards, will have the advantage of being the first to offer these exciting experiences to players.

In the recent decade, the gaming industry has expanded significantly, especially with respect to visibility. This expansion, however, has stopped short with regard to the attraction of new players. While casinos in Macao continue to attract new patrons, the customer base in the United States has remained statistically unchanged since 2002. Therefore while revenues are increasing, it is due to the loyalty of the same players, not the attraction of new ones. Now that two-thirds of the United States population lives within at least two hours driving distance of a casino, it is easier than ever to play, yet the customer base remains stagnant.

An estimated 165 million Americans gamble, yet only 58 million visited casinos in 2006. How can the industry bring 107 million players back to the casino, let alone entice new players? By increasing the player perception of the utility associated with casino[5]

1. Fun.
2. Value.
3. Benefit.

In the 1980's, the gaming market in Las Vegas changed forever with the beginning of the integrated destination resort era. Today, gaming accounts for less than half of contemporary revenues from the Las Vegas strip. Casinos are more accessible to players, offer a wider variety of entertainment, and still the customer base remains unchanged. Perhaps the gaming experience itself needs to change. Through a broadband network, this change becomes possible through the larger channels available for the transfer of information.

[5] As presented by Jay Walker of Walker Digital in 2007.

Slot machines are not necessarily boring, but the experience has remained relatively unchanged for over 40 years. The ability to maintain consistent consumer interest in a product that does not evolve is difficult in any industry, let alone gaming. While tickets have replaced coins, and some measure of bonus interaction has been created, the slot machine experience has remained essentially the same:

1. Money goes in.
2. Player interacts with machine.
3. Machine displays movement.
4. Outcome is displayed.

While this experience has been enhanced over the years with the addition of bonus payouts, game variety, and some degree of interaction and technology, it is the player's perception of change that matters regarding revenue.In this case, 107 million American players have voted with their wallets by pursuing other arenas of entertainment.

Enter the advanced capabilities of broadband infrastructure and open standardization of GSA applications. Not only will there be unlimited potential for changes regarding player/machine interaction, but integrating new applications will not be ordeal for the operator.

Imagine player interaction that allows the choosing of games and denoms, to the extent that a player can choose the specific game and denomination of play from any point on the floor. Consider the slot machine as a point for the advertisement of entertainment pricing. What if player expected value was analyzed during every play session, and real time offers based upon these statistical conclusions were displayed on the machine during game play, and rewards/bonus accrual was easily accessible from a simple touch screen?

There are unlimited possibilities regarding potential interactions, each one of which would be new with respect to giving the player a personalized and custom with their chosen slot machine during the course of play. Concepts like memories, player feedback, money manager, social play, loss insurance, property packages, shopping discounts, streaming video, and stored preferences are not new, but until the inception of broadband infrastructure and GSA open standards, their application was relatively impossible.

Now that there is an infrastructure advanced enough to allow such large flows of information, as well as GSA open standards, the applications and innovations necessary to retain player interest are easily attainable, as is the return on investment consistent with the attraction of a larger and more diverse customer base.

6 Broadband Upgrade Estimation

All new properties are being built with broadband infrastructure. Therefore it is important to note that the upgrade to broadband is not simply necessary for G2S and S2S implementation, it is a necessary sunk cost that will have to be expended for an operator to remain competitive in the future.

Some properties may require more or less work, and several newer properties may already have broadband implemented. The following table shows the costs associated with one property's recent upgrade to broadband including structural changes and duct-work, as well as wiring upgrades.

Component	Total Cost	Games Supported	Cost per game
Robertson Duct	$384,000.00	2200	$174.55
CAT-6 Cabling	$158,000.00	2200	$71.82
Patch Cables	$13,000.00	2200	$5.91
Rack 4-post+wire mgmt	$6,525.00	2200	$2.97
Fiber optic backbone	$42,000.00	2200	$19.09
Duct Work & Cables	**$603,525.00**		**$274.33**
6513 Core Switch	$217,380.00	2200	$98.81
2950-48 w\GBIC Edge	$167,160.00	2200	$75.98
Network Switches	**$384,540.00**		**$174.79**
Total cost	**$988,065.00**		**$449.12**

The property has 2200 slot machines, and therefore if the cost of the upgrade and structural changes is distributed the expenditure is approximately $450 per machine. Considering the analysis below of both savings and return on investment, the above sunk cost can easily be absorbed by labor savings alone.

7 Labor Cost Savings

The cost of broadband upgrade is easily mitigated by the several advantages afforded through the implementation of S2S and G2S. Through the open standards, several inconveniences requiring labor hours will cease to exist, thereby cutting operator costs significantly. The following problems will no longer require labor hours:

- Bill Validator Upgrades

  Instantly downloadable with G2S

- EPROM/Game Conversion

  Not necessary since G2S enables game content download

- Game Code Verification

  Not an issue as game codes are available via broadband

The table below shows industry average labor costs for slot technician personnel. In order to isolate the hours that are worked on the problems that will be eliminated through the implementation of open standards, it is necessary to calculate how many labor hours per machine per year are worked.

Breakdown of Current Labor Costs[6]

Games	1,000	2,000	3,000
Technicians[7]	8	16	24
Wage/Hr[8]	$20	$20	$20
Benefit Multiplier	1.3	1.3	1.3
Wage/Yr Per Tech	$54,080	$54,080	$54,080
Labor cost/yr	$432,640	$865,280	$1,297,920
Total Work Hours/Year	16,640	33,280	49,920
Hours per machine per year	16.6	16.6	16.6

[6] All currencies USD

[7] Assuming hiring is based upon one technician per 125 gaming machines.

[8] Multiply all cost calculations by .5 in order to determine value of technicians paid $10/hr.

Using industry average maintenance schedules, the table below isolates each category of work that is done for a given machine per year rounded to the whole number. The table shows only the labor costs attributed to each specific issue, and does not take into account the potential revenue lost due to maintenance. The figures contained within the red outline indicate problems that cost labor hours that will be eliminated after the implementation of the open standards.

	Labor cost breakdown[9]			Hours Per Machine Per Year
# of Machines	1,000	2,000	3,000	
Preventative Maintenance	$162,240	$324,480	$486,720	6
Game Code Verification/Bill Validator Upgrades	$54,080	$108,160	$162,240	2
Bill Validator Upgrades	$27,040	$54,080	$81,120	1
EPRON/Game Conversion	$81,120	$162,240	$243,360	3
Machine Failure	$108,160	$216,320	$324,480	4
Total Labor Cost/Yr	$432,640	$865,280	$1,297,920	16

Therefore, when broken down, the labor hours attributed to issues that will no longer require labor hours are as follows:

Games	1,000	2,000	3,000
Savings	$162,240	$324,480	$486,720
Savings/machine/yr	$162.24	$162.24	$162.24

When analyzed in conjunction with the earlier cited cost of $450 per machine in order to accomplish the upgrade to broadband, the sunk cost is easily recovered through less than three years of savings through labor. After the cost is recovered, the savings continues as the labor hours to address those issues are not required due to removal of the problems through G2S implementation.

While it is important to note that implementation of G2S and S2S will solve several problems that would otherwise require significant investment in labor, the development of these standards was not focused on saving labor costs, but on increased efficiency and return on investment. It is through the value of real time floor management that the true significance and value of these standards can be analyzed. In the future, however, the value of real time floor management will be significantly increased by the innovation of specialized software that will enable applications and analysis that are not currently possible.

[9] Based upon 2000 hour work year with 80 hours of paid vacation removed from labor cost calculations.

8 Real time floor management

Real time floor management encompasses the large portion of value represented by the implementation of G2S and S2S standards. Until the development of the standards and broadband capability, the efficiency of real time floor management was nothing more than an operator's dream.

Current operations depend upon the watchful eye of personnel, but regardless of employee efficiency it is hardly possible to achieve the accuracy or instant information that is accomplished through online real time computer monitoring. One of the largest areas of loss is game malfunction. If a game or internal system ceases to operate correctly, there is rarely a visual indicator of such, and therefore a significant lag can occur between the actual malfunction and personnel recognition of that problem.

Due to the success of ticket-in ticket-out (TITO) technology, games no longer accept coin and are therefore dependent upon the bill validator in order to accept currency. When a bill validator malfunctions, there is no visual indication or notification sent to management, the game sits on the floor unable to accept currency until detected through preventative maintenance rounds or player notification at the cage.

If a game malfunctions, there is no electronic notification to management. When the error is determined, the machine is tagged out of order and a technician is called to repair the problem. For all malfunctions of floor systems there are at least two lag times.

1. Time between moment of malfunction and "out of order" sign posting
2. Time between "out of order" sign posting and actual repair by technician

Therefore there is no way to know on average the actual lag time between malfunction, recognition of malfunction, and actual correction of malfunction. What can be estimated, however, is the lost revenue for every amount of time that machine remains inaccessible to players. Through analyzing player handle it is possible to estimate the cost of the lag times between malfunction and repair:

Malfunctioning Machines Cost Operators in Addition to Labor Expenses

Average bet (USD)	$0.5	$1.00	$5.00
Average decisions/hr	360	360	360
Hold Percentage	10%	10%	10%
Potential Revenue Loss Per Hour	$18.00	$36.00	$180.00

The lost revenue depends upon the average bet, and it becomes clear that the cost of a malfunctioning bill validator can mount up quickly. Not only is there a lag time between the operator being notified of malfunction and actual moment of malfunction, but then there is the time it takes the technician to actually schedule and complete the repair. The above table does not consider time of year, which can significantly increase the cost, loss of potential revenue, or flat out loss incurred by an operator in the case of any malfunction.

While such estimations may seem like the worst case scenario, consider the photograph below, taken during a busy festival weekend in Reno, NV. Players were greeted by this entire bank of machines, upon entry to the casino from the street. This bank of six machines remained out of order for the duration of the three day weekend.

Figure 8-1 One of six out of order machines at the entrance of a Reno casino (Sept. 2007)

If analyzed over the entire three-day weekend, not accounting for seasonal events, holidays, and the street festival, the cost of this malfunction can be calculated. With a conservative average bet of five cents per play, this bank of out of service machines cost the operator almost $8,000 of potential revenue. This does not take into account the amount of time it took for management to recognize the malfunction and label the machines out of order, which would increase the potential revenue loss. Through the implementation of broadband infrastructure and G2S protocols, this bank of machines would not have remained out of order over the course of three days.

The true value of real time floor management will only be known in the future, through the development of application programs that further drive efficiency and analysis of data. There is return on investment to be found in every aspect of operational management, and each value can be found through determining the potential revenue generated by game play.

Not only are malfunctions costly, but upgrades are as well. Every time a new currency format is released by the National Treasury, bill validators need to be upgraded in order to accept the new currency. Current bill acceptor upgrades are extremely labor intensive and make machines unavailable to players. With the implementation of G2S and S2S the new currency information can be transferred instantly to the bill validators on the casino floor with the touch of a button. Further, through G2S implementations, not only will operators get real time electronic notification of malfunction, but the validator can be corrected and/or upgraded electronically without ever having to schedule a maintenance technician to the floor.

Not only is broadband necessary for the very latest in game technology, but it will allow for the instant upgrade of systems, switching of games, and specific player interfaces. Applications that were too large to pass through current slow infrastructure will easily be implemented and profited from due to broadband capabilities and open standards.

9 Conclusion

Through the Gaming Standards Association, open standards and protocols for gaming industry technology are available. With broadband infrastructure in place, several issues that used to cost time and money are now solved simply with the touch of a button. The implementation of S2S and G2S protocols will not only eliminate the source of headaches caused by the non-interface of proprietary languages, but it also opens the door to more efficient data analysis and player tracking.

Broadband casino floor infrastructure is the key to the latest applications that will not only drive management efficiency, but player loyalty and revenue as well. The common slot interface of reels and bet buttons, mechanical or otherwise, will change dramatically. The player's club card will be the key to a personalized interface determined through the analysis of data collected from the specific player's activity. A bank of machines in a casino may have several players enjoying the same game through a different interface.

In a competitive industry it is innovation and open standards that drive efficiency, progress and ultimately, revenues and profit. The gaming industry is one of the most competitive on earth, and through the open standards of G2S and S2S, this new era is on the horizon. For over 100 years the interface between player and slot machine has remained relatively unchanged. Whether digitized or physical, there are reels, pay-lines and bet buttons. The first operator to advertise slots that have an iPod interface, live sports or news, and market uniquely tailored show or dinner packages during game play will have a significant advantage over the competition.

In 2009 the television broadcast industry will switch to the standard of High Definition Television (HDTV). The gaming industry equivalent is the G2S standard. Television broadcast companies are allowing for a comfortable consumer transition period by currently offering simulcast presentations of television shows and channels in both HD and regular broadcast. In the gaming industry the transition to G2S will also be comfortable, with SAS and G2S compatible machines, but like HDTV, the transition to G2S will be permanent. However, like the household that delays the upgrade to a high definition receiver beyond the current transition period, the operator without a broadband infrastructure will eventually lose entertainment value.