

Security Effect on B2B and B2C Operations using 3G M-Commerce

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ABSTRACT

The full scope of how mobile technologies will affect individuals' lives in the areas of business, education and other sectors has yet to be appreciated. Innovative mobile technologies are causing disruptive, tectonic changes that will shape inalterably the way the next generation will live, work, play and interact with the rest of the world. Indian business leaders, government, policy makers, leading academics and other experts are required to discuss government and business approaches to mobile commerce, mobile banking, mobile governance and security related issues in M-Commerce that will have a positive effect on India's economic and social development. This paper shows the influences of security on B2B and B2C operations of 3G based M-Commerce.

Keywords

third generation, m-commerce, security, B2B, B2C.

1. INTRODUCTION

E-Commerce, or the buying and selling of goods and services on the Internet, has become a part of daily life for many people. As the Internet expands to every corner of the globe, it is becoming easier and easier to access it from a wide variety of devices [1]. E-Commerce over mobile devices has now been termed Mobile-Commerce (M-Commerce)[2]. The M-Commerce by definition is the E-Commerce that is implemented using wireless solutions such as cell phones, pocket PC's, and PDAs. It allows a user to purchase goods and services on the move, anytime, and anywhere. M-Commerce applications and the current 3-G have been finding it hard to be widely used in India. Mobile commerce is a natural result of combining two strongly emerging trends: electronic commerce and pervasive computing. M-Commerce represents another wave of the e-commerce invasion i.e. changing the nature of business in the 21st century [3]

The evolution of mobile network technology can be divided into four generations: 1-G (first generation), 2-G, 2.5-G, and 3-G. Some of the standards for each generation are [4] [5]

- 1-G: Advance Mobile Phone System (AMPS)
- 2-G: Global System for Mobile Communication (GSM), Code Division Multiple Access (CDMA), High Speed Circuit Switched Data Technology (HSCSD)
- 2.5-G: General Packet Radio System (GPRS), Enhanced Data Rate for GSM Evolution (EDGE)
- 3-G: Universal Mobile Telephone Standard (UMTS).

Table 1. Technology and features of various generations

Generations	Technology	Bandwidth (Kbps)	Features
First Generation Mobile (1-G)	Advanced Mobile Phone System (AMPS)	9.6	Analog voice service No data capabilities
Second Generation Mobile (2-G)	GSM (Global System for Mobile Communications) CDMA (Code Division Multiple Access)	9.6-14.4	Digital voice and Data services Advance messaging Global Roaming Circuit Switched Data
2.5 Generation Mobile (2.5-G)	HSCSD (High Speed Circuit Switched Data) GPRS (General Packet Radio Services) EGDE (Enhanced Data Rates for Global Evolution)	9.6-57.6 9.6-115 64-384	Extension of GSM Higher Data speeds Packet Switched Data
Third Generation Mobile (3-G)	IMT-2000 (International Mobile Telecommunications 2000) UMTS (Universal Mobile Telecommunications Systems)	64-2.048	Always on IP enabled Very High speed data services

The third generation mobile networks are based on 2-G and 2.5-G networks and have some enhanced features. The underlying technology is same as the previous technology that enables the user to be connected without any interruptions and delays with high efficiency usage of networks. All it matters is to put a new layer on it and to provide the latest and future perspective services. According to a research in Lulea University of Technology the technology and features associated with 3-G are illustrated in the table 1.

2. M-COMMERCE APPLICATION FOR B2B AND B2C OPERATIONS

In a competitive marketplace, the need is to understanding how evolution of 3-G service affects the previous technologies. Financial transaction based organizations have moved from product centric to customer centric position. In this way, companies seek more competitive advantages in building good reputation for superior performance like secure

financial transaction, on time delivery, accurate information, better-trained personnel and quicker resolution of complaints. The following table shows the B2B and B2C Operations for M-Commerce Applications [3] [6] [7]:

Table 2. B2B and B2C Operations for M-Commerce applications

B2B and B2C Operations	M-Commerce Applications
Mobile Financial Applications (B2C, B2B)	Banking, brokerage, fund transfer, payments for mobile users
Mobile Advertising (B2C)	Sending user specific and location sensitive advertisements
Mobile Inventory Management (B2C, B2B)	Location tracking of goods, boxes and People
Wireless Data Centre (B2C, B2B)	Information downloaded by mobile users
Mobile Entertainment (B2C)	Video on demand, online TV, Online gaming etc.
Mobile Booking and Ticketing (B2C, B2B)	Services allowing customers to book, tickets for travel, hotel and events
Mobile Marketing Research (B2C)	Obtaining instant feedback from customers
Mobile CRM, Customer Support (B2C, B2B)	Customer acquisition and retention by providing truly personalized content
Mobile Distance Education (B2C, B2B)	Taking classes, training courses using streaming video and audio
Wireless Business Re-engineering (B2C, B2B)	Information up/downloading by mobile users (e.g. adjusters in an insurance company).

3. STATEMENT OF PROBLEM

Analysis of impact of security challenges, security risks, and security implementations within 3-G M-Commerce in 3-G M-Commerce are the main issues in this research. In today's E-Commerce world, the security is the major issues that need to be constantly monitored and improved. For the extensive use of 3-G enabled M-Commerce, it is necessary to see the impact on businesses and their customers. By expanding E-Commerce to mobile devices, it is also necessary to ensure that these devices are protected against security threats. M-Commerce faces the same security threats that E-Commerce faces plus many others due to the mobile nature of the products [8].

Why the users are not using m-commerce applications? Even B2B and B2C operations are available for M-Commerce applications; the users do not show much attention towards the using m-commerce applications. Even security features have been improved, 3G (faster internet service on mobiles) has been started, but the number of users is slowly increased [9]. This research shows how the security issues influencing the behavior towards using m-commerce applications.

According to James Messham, fraudsters and hackers will actively target all M-Commerce services, service providers and the underlying infrastructure [10]. An article on "Security in M-Commerce" state that the M-Commerce industry is still in a developing phase. The protocols used in M-Commerce are inherited from E-Commerce [11]. According to Mike Fuller, many security challenges and weaknesses exist within M-Commerce systems. In order to expand the usage of M-

Commerce, the manufacturers, the developers, and the wireless carriers need to gain the consumer trust by implementing the security features into their devices [12]. M-Commerce users need some security aspects like Confidentiality, Integrity, non-repudiation, Authentication and Authorization [13][14][15]. Sudhir Dixit et al. said that the third generation networks and services present opportunities to offer multimedia applications and services that meet end-to-end quality of service requirements [16].

4. OBJECTIVES AND HYPOTHESIS

The main objectives are to examine the impact of security on B2B and B2C operations using 3-G M-Commerce applications and to examine the impact of quality of services on B2B and B2C operations using 3-G M-Commerce applications.

H01: There is no significant difference in the perception of B2B and B2C operators about security in 3G M-Commerce across different demographic characteristics.

H02: There is no significant difference between security issues of 2G and 3G networks perceived by B2B and B2C operators.

H03: The user experience does not vary according to various security issues in 3G based M-Commerce Applications.

H04: Change in 3G Network security issues do not influence the intention to participate in M-Commerce operations.

5. RESEARCH METHODOLOGY

The research has been carried out through two key modules: primary research and extensive desk research. The Secondary research has involved an in-depth survey of various literature sources like journals, newspapers, magazines, etc., and primary data collection was done through structured questionnaire and interviews across a cross-section of stakeholders. Extensive desk research has been done to build an in-depth understanding of the security and quality in 3-G M-Commerce applications for B2B and B2C operations. Information from the various published resources such as Journals, Newspapers, Magazines, research papers, etc. and other research bodies has also used to validate the data. It is made with the consideration of the purpose, that is, to gain a better understanding of the dimension that affect the customer, the business perceived M-Commerce security for B2B and B2C operations, the 360-degree stakeholders' survey was done. Further, we did investigation of the customers from various sectors like banks, on line shopping and other B2B operators in northern India.

The primary data has been collected during mid 2011. Also the data was collected through online form submission using 'Gmail' online services. The method creates online form and the data is automatically saved in ms-excel online. The questionnaire was sent to the M-Commerce users and the users are required to fill it online. Snowball sampling approach has been used to find out the real users of m-commerce, since usage of m-commerce is still in the nascent stage in India. The questionnaire has been filled by the users, who are involved in m-commerce transaction or have shifted from manual and e-commerce activities to m-commerce activities. However, deliberate effort has been made to bring randomness in the sample chosen by selecting the respondents based on random sampling from the list of m-commerce users made with the help of snowball sampling [17][18]. The data of online form submission is saved in ms-excel form. Data was collected, coded and entered into SPSS 12.0 before

processing the same for analysis. Statistical tools used to analyze the data as per the objectives included Descriptive Statistics (such as frequencies, Percentages, Arithmetic Averages, Standard Deviations), reliability and validity, T-test, chi-square test.

6. RESULTS INTERPRETATION

The data collected through ‘Gmail’ service and implemented into SPSS. Some methods applied on data to get the results. Following are the results for various hypotheses:

H01: There is no significant difference in the perception of B2B and B2C operators for 3G M-Commerce Applications across different demographic characteristics.

Table 3. Descriptive statistics for relationship between B2B and B2C

Factors	B2C				B2B			
	N	Mean	S.D.	Std. Error Mean	N	Mean	S.D.	Std. Error Mean
Age Wise Group	201	2.76	1.055	.074	104	3.54	1.314	.129
City Wise	201	1.10	.361	.025	104	1.02	.138	.014
Gender	201	1.37	.485	.034	104	1.38	.486	.048
Education Qualification	201	2.77	.421	.030	104	2.75	.435	.043
Marital Status	201	1.25	.436	.031	104	1.16	.372	.036
Occupation	201	2.06	.341	.024	104	2.35	.517	.051
Income	201	3.58	1.306	.092	104	4.17	1.210	.119
Mobile Device	201	1.68	1.009	.071	104	1.51	.955	.094
Brand Name of Mobile	201	2.26	1.773	.125	104	1.69	1.462	.143
Cost	201	2.37	.643	.045	104	2.47	.607	.059
3G Service Provider	201	2.10	1.513	.107	104	1.98	1.157	.113

Table 4. Chi-Square Test to identify the relationship between B2B and B2C

Factors	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square for AGE	.014(b)	1	.907
Pearson Chi-Square for QUALIFICATION	.170(b)	1	.680
Pearson Chi-Square for MARITAL STATUS	45.251(a)	3	.000
Pearson Chi-Square for INCOME GROUP	31.066(a)	4	.000
Pearson Chi-Square for OCCUPATION	45.251(a)	3	.000
Pearson Chi-Square for 3G NETWORK	28.014(a)	4	.000
Pearson Chi-Square for CITY WISE	4.781(a)	2	.092

Here the relationship identification between B2B and B2C, so there is relationship between B2B and B2C according to marital status, income group, occupation, network, and the age of person, while there is no relationship between B2B and B2C according to qualification, gender and city. So for the use of B2B or B2C operation there is no hard and fast rule to do these operations by a selected group. Basically highly qualified, male, unmarried, high income group and middle aged persons are the main users of B2B and B2C operations. So this research shows that for the identification of impact of security and quality in 3G m-commerce applications on B2B and B2C operations, both operations can be taken collectively. So the hypothesis H01 is agreed that there is no significance difference in the perception of B2B and B2C operations for 3G m-commerce applications across different characteristics.

H02: There is no significant difference between security issues of 2G and 3G networks perceived by B2B and B2C operators.

Table 5. One sample test for comparison of security attributes between 3G network and 2G or 2.5G network

Factors	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the df	
					Lower	Upper
Trust on Network	.490	304	.625	.030	-.09	.15
Secure 3G Accessibility	.918	304	.360	.056	-.06	.18
Security in 3G as in 2G	6.99	304	.000	.357	.26	.46
Overall Security	7.40	304	.000	.403	.30	.51

This table displays the number of cases, mean value, standard deviation, and standard error for the test variable(s). Since the One-Sample T Test procedure compares the mean to a specified value, it is useful to know what the mean value is. The test observed that

- a significance value of 0.625 in case of trust on 3G networks, indicates that there is no significant difference between security issues of 2G and 3G networks perceived by B2B and B2C operators.
- a significance value of 0.360 in case of secure 3G accessibility, indicates that there is no significant difference between security issues of 2G and 3G networks perceived by B2B and B2C operators.
- a significance value of 0.000 in case of more security in 3G network as compared to 2G network, indicates a significant difference between security issues of 2G and 3G networks perceived by B2B and B2C operators.
- a significance value of 0.000 in case of speed, indicates a significant difference between security issues of 2G and 3G networks perceived by B2B and B2C operators.

H04: The user experience does not vary according to various quality and security issues in 3G based M-Commerce Applications.

Table 6. One sample test for user experience for attributes

Factors	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Diff.	95% Confidence Interval of df	
					Lower	Upper
Confidentiality	9.428	304	.000	.672	.53	.81
Authentication	15.239	304	.000	.764	.67	.86
Integrity	12.491	304	.000	.564	.48	.65
Network Trust	8.491	304	.000	.449	.35	.55
Mobile Trust	4.238	304	.000	.216	.12	.32
Protocols Compatibility	6.368	304	.000	.357	.25	.47
Secure Data Transfer	5.616	304	.000	.361	.23	.49
Transaction Speed	10.653	304	.000	.692	.56	.82
Simple Format for Transaction	11.875	304	.000	.784	.65	.91
Redirection and use of links	1.220	304	.223	.062	-.04	.16

This one table statistics displays the number of cases, mean value, standard deviation, and standard error for the test variable(s). Since the One-Sample T Test procedure compares the mean to a specified value, it is useful to know what the mean value is. The test observed:

- a significance value of 0.000, indicates that there is significant difference i.e. the user experience vary according to various security issues in 3G based M-Commerce Applications.
- a significance value of 0.223 in case of Redirection and use of links, indicates that there is no significant difference or the user experience does not vary in 3G based M-Commerce Applications.

H05: Change in 3G Network security issues do not influence the intention to participate in M-Commerce operations.

Table 7. chi square statistics for availability of government regulation

	Observed N	Expected N	Residual
YES	183	152.5	30.5
NO	122	152.5	-30.5
Total	305		

Table 8. chi square statistics for trust intention towards using M-Commerce

	Observed N	Expected N	Residual
YES	249	152.5	96.5
NO	56	152.5	-96.5
Total	305		

Table 9. chi square statistics for problem faced in M-Commerce

	Observed N	Expected N	Residual
YES	166	152.5	13.5
NO	139	152.5	-13.5
Total	305		

Table 10. chi square statistics for knowledge increase by using M-Commerce

	Observed N	Expected N	Residual
YES	274	152.5	121.5
NO	31	152.5	-121.5
Total	305		

In this hypothesis test, the observed number of different security attributes shows the behavioural intention with the M-Commerce activities. The government rules and regulation for security purpose is available. The transaction is completely secure, and all M-Commerce website follows these rules and regulations. Trust intention towards use of M-Commerce is very fine. Because all M-Commerce and e-commerce websites follow government rules and regulation and thus it create trust among users. 249 out of 305 users respond that trust intention creates more users to do M-Commerce transaction. In addition, knowledge of security in M-Commerce increases the user of M-Commerce. There are so many users, who faced problems in M-Commerce transaction.

Table 11. chi square test statistics for user intention according to security attributes

	Availability of Govt. Regulation	Trust towards using M-Comm.	Faced Problem in M-Comm.	Knowledge Increase by using M-Comm.
Chi-Square(a)	12.200	122.128	2.390	193.603
df	1	1	1	1
Asymp. Sig.	.000	.000	.122	.000

a 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 152.5.

This test indicates that the observed distribution does not conform to the hypothesized distribution. The significance level is less than .05. The distribution of security attributes differs from the distribution hypothesized. Only one factor has more than 0.5 significance level. Most of the users are facing problems in M-Commerce transaction. The problems arise due to less experience and less awareness of M-Commerce transactions. This creates not to do M-Commerce transaction.

7. CONCLUSION

The Indian people does not show much interest in M-Commerce activity, because of less trust on mobile devices, less awareness and less trust on networks. Therefore, it is very difficult to collect the data from the actual users. For data collection, I tried to users to do M-Commerce transaction, so that the result can be interpreted in a right way.

The users are afraid to do M-Commerce transaction because of the trust on 3G wireless network, trust of their mobile devices and the network availability of 3G networks

everywhere without interrupting the transaction. Redirection and use of links is not properly handled by the user and user is unable to explore all the links available on web page, because some of the web pages will open in new window, then how to access that new window, or how to reach the previous window (most of the mobile devices are not multitasking). The major problem faced by the user is the network availability of 3G network.

The impact of security in 3G M-Commerce applications on B2B and B2C operation is not so positive, because the users have not faith on their mobile devices, the 3G network availability and the trust on 3G networks.

The user is not much aware about the m-commerce applications, so the policies should be made in this regard to promote and regulate 3-G M-Commerce in India.

If the user is aware about the m-commerce application, then also he/she could not create faith in m-commerce. Also from the side of m-commerce application provider, the security mechanism is adopted. This 3G service provider, m-commerce application provider and the government should create some regulations in this regard. Then only the users create the faith to do m-commerce transaction.

8. LIMITATIONS AND FUTURE SCOPE OF THE RESEARCH

- One of the main limitations is that during the course of research, many new companies have 3G license and many new users have not been made the part of sample.
- The sample size in this research study is 305. A significantly large sample size may be more representative of population.
- This study focused on Banks, Ticket Booking and Online Shopping operations only. The study is confined to M-Commerce applications for B2C and B2B operations in northern region only.
- Only 3-G M-Commerce related security issues would be addressed, while 4-G M-Commerce has been already initiated in developed countries.

9. REFERENCES

- [1] <http://www.indiaonline.com/cyva/repo/mcom/ch01.html> (Dec. 2011)
- [2] Shahidul Islam, 2006 Mobile Commerce, A Master Thesis for Lulea University of Technology
- [3] P. Venkataram, 2003 Mobile Commerce – Vision and Challenges, at ITPC, Nepal, IISc Bangalore INDIA
- [4] <http://www.thesspa.com/sspanews/102010/article2.asp> (Oct. 2011)
- [5] Aftab and Iqbal, 2006 3-G Mobile Communication Services Perspective, A Master Thesis for Lulea University of Technology
- [6] commerce:<http://www.smarte-commerce.com/emerging-M-Commerce/> (July 2011)
- [7] endec:<http://www.endeca.com/en/resource-center/whitepapers/b2b-ecommerce-trends-2011.html> accessed (Feb. 2012)
- [8] http://www.india-reports.com/summary/ecommerce_in_india.aspx (Nov. 2011)
- [9] Ghosh, K.A., and Swaminatha, T.M., Software security and privacy risks in mobile ecommerce, Communications of the ACM, Volume 44 (2), Feb 2001, pp 51-57
- [10] James Messham, 2000, M-Commerce Security, International Clearing House Ltd.
- [11] Scarlet, Knospe 2011, Security in M-Commerce, (Aug. 2011)
- [12] Mike Fuller, M-Commerce and Security, A Project <http://theory.stanford.edu/~iliano/courses/06S-GMU-ISA767/project/papers/fuller.pdf> (Oct. 2011)
- [13] Mynttinen J, 2001 End to End security of mobile data in GSM, Helsinki University of Technology, Helsinki, Finland
- [14] Hage D., 2001 Secure E-Commerce: WAP security in M-Commerce, University of South Australia
- [15] Vyas, A., O'Grady, P., 2001 A review of M-Commerce technologies, Internet lab technical report, University of IOWA.
- [16] Sudhir Dixit, Yile Guo, and Zoe Antoniou (Feb-2001, Resource Management and Quality of Service in Third-Generation Wireless Networks, IEEE Communications Magazine, PP 125-133.
- [17] Leo A. Goodman, August 2011 Sociological Methodology, Volume 41, Issue 1, pages 34–353.
- [18] Mark S. Handcock, Krista J. Gile Aug 2011 arXiv:1108.0301v1 [stat.AP]