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An Empirical Description of the Internet Sector of the US Economy: Evidence from New Company Filings

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ABSTRACT
This study is an empirical analysis of the Internet business models used by United States firms that filed for initial public sale of securities from 1996 thru 2001. Analysis included identification of the business modes deployed for generating revenue from the Internet, extension of Eisenmann's [2002] classifications of Internet business models and the matching of firms to the extended classifications.

The analysis revealed that Internet companies comprise a significant portion of the emerging U. S. economy. Further, a significant percentage of traditional companies derive material revenue from the Internet. The results also suggested that there is a significant differentiation of Internet business models. Finally, the results expand the definition of an Internet firm to include firms that are not limited to direct service-related functions described by Eisenmann. In fact, numerous firms derive their existence by providing services, hardware or software that supports the Internet sales and services of other firms.

Keywords
Internet Business Models, Internet Taxonomy, Internet Economy

INTRODUCTION

Numerous academic and financial press articles examine the economics of firms that have built their business around the Internet. A central maintained assumption in many of these articles is that such firms are an exceptional, homogenous segment of the economy. This assumption is bolstered by the limitation that the articles generally apply loosely held notions for identifying firms in lieu of any precise operational definition of an "Internet firm". A related limitation is that regardless of how Internet firms are defined, no sound methodology has emerged for generating a complete and accurate identification of firms.

This study addresses these limitations from an empirical perspective by analyzing the business model descriptions that 3,468 U. S. firms provided in filings with the United States Securities and Exchange Commission (SEC) from 1996 thru 2001. From this analysis, a comprehensive list of the Internet business models is identified. Finally, descriptive analysis of the frequencies with which firms deploy these models is provided. Analysis reveals that Internet firms as defined comprise 24.34% (844 firms) of the sample (3,468). Analysis also indicates that of the 844 Internet firms identified in the sample, only 38.2% fell within Eisenmann's Internet service model definition.

This study extends the contribution made by previous research on the relationship of the business to the Internet. For example, Parente (2001); Slyke and Belanger (2003) describe relationships between entities. Eisenmann (2002), Rappa (2001), Mahadevan (2000) and Weill and Vitale (2001) develop models that focus on business activities. Although the influence of each of these models is embedded within this analysis, the Eisenmann model is employed as a core model for the study's classification scheme because it provides a recent amalgamation of the research. The incremental contribution of this study is that it provides an empirical confirmation of these models by linking data to the theoretical framework. In addition, this study provides a motivation for extending the existing service-related models to include firms that derive their existence by providing services, hardware or software that support the Internet sales and services of other firms.

EMPIRICAL ANALYSIS OF INTERNET BUSINESS MODELS

This study institutes the following five-step approach for analyzing the Internet business models that firms deploy:
Step 1: Develop a definition of an Internet firms;
Step 2: Identify all firms in the sample that meet the Internet firm definition.

Step 3: Develop a comprehensive index and description of business models employed by the Internet firms that we identify.
Step 4: Match the Internet firms that we identify to the appropriate Internet business model(s) in our index.
Step 5: Provide descriptive statistics and analysis of the composition of the firms in our Internet business model indices.

Defining an Internet firm

In practice, most firms deploy the Internet in a variety of ways. However, the purpose of this study is to segment firms based upon the means by which the Internet makes them economically unique. Given this purpose, we define an Internet firm as one whose demand for the products and services that it provides is significantly driven by the usage or existence of the Internet. Since demand is an economic variable that cannot be directly measured, demand is indirectly measured through analysis of the firm's revenue process including analysis of:

(1) The products and services provided; Internet firms include firms that offer products and services that have a direct relation to aggregate levels of Internet usage.
(2) The firm's methods of delivering products or services; Internet firms include firms that create additional demand by employing the Internet to deliver services or information, content, software or other products that can be transmitted digitally.
(3) The firm's methods of transacting sales; Internet firms include firms that that create or augment their share of the demand for their products by employing Internet protocol to transact sales.
(4) The firm's customers; Internet firms include firms engaged in servicing or selling to firms described in the previous category; demand for the firm's products and services is driven by Internet usage.

In contrast, the following business uses of the Internet are excluded from this analysis:

- Customer relations- Many companies engage the Internet for product and service promotion, customer service, obtaining consumer information and tracking customers. .
- Operations- Practically all public companies maintain access to the Internet and employ the Internet in various aspects of the operations of the firm, including internal and external communication, data transmission, purchasing, and research.
-

Since many firms derive revenue from the Internet incrementally, rather than either exclusively or not at all, a critical element in our analysis is the variable, INTERNET, which measures the degree to which firms are dependent upon the Internet for generating revenue. INTERNET assumes one of the following ordinal values for each firm:

0- The firm is not materially dependent upon the Internet for generating revenue. Firms in this category may maintain websites, provide Internet access for employees and utilize the Internet for various operational transactions. However, revenues are not materially dependent upon the Internet and in the absence of the Internet the company would continue to operate in essentially the same line of business.
1- The firm is dependent upon the Internet for generating a material, but not primary portion of the firm's revenue. Firms in this category generate a majority of their revenues irrespective of the Internet. However, the Internet materially increases the demand for the company's products or services. This code includes firms that sell merchandise primarily through stores or by phone, but also conduct Internet sales. This code is also appropriate for firms that operate one or more secondary business segments that are dependent upon the Internet for generating revenue.
2- The firm is dependent upon the Internet for generating a primary, but not exclusive portion of the firm's revenue. Greater than 50%, but less than 100% are a result of the Internet. This code includes firms who primarily sell or deliver online, but also through other channels. This code also includes firms who derive most of their revenue from Internet support services, but also derive material revenue through other services (*e.g.*, Internet consulting, Internet advertising).
3- The firm's business model is exclusively dependent upon the existence of the Internet. This code includes firms that have no revenue generation apart from the Internet. Without the Internet, the firm would not exist as described.

Identifying Internet Firms

Step two requires the identification all SEC firms in the sample period, 1996 – 2001 inclusive, that meet the definition as an Internet firm. These determinations are based upon a case-by-case investigation of each firm's process for generating revenue-utilizing information firms are required to provide in SEC filings. The following sub-sections describe the SEC disclosure requirements, our population of firms and the procedures for assigning INTERNET code values.

SEC Required Disclosures on the Nature of a Firm's Business

The Securities and Exchange Commission requires all registered U. S. firms to provide investors with a Description of Business in all annual reports (10-Ks) and registration statements (required for the sale of new securities http://www.sec.gov/about/forms/regs-k.pdf). This description provides investors with a detailed narrative of the firm's

business model, including a description of the firm's principal products and services, their methods of delivery, their principal customers, technologies employed and other specific information deemed essential to give investors an understanding of the nature of the firm's business. Firms operating in more than one line of business are required to disclose the percentage of total revenue contributed by each significant business.

Disclosures such as these provided in documents filed with the SEC have several characteristics that are desirable for their use as a basis for accurately classifying firms. First, these business descriptions provide focused discussion of the firm's business model and operations from an insider's perspective, that of the firm's management. Second, the information contained in the summary presumably exhibits a high degree of reliability. Firms face strong incentives to provide accurate disclosure because auditors, underwriters and the SEC will scrutinize the disclosure. Specifically, the SEC devotes considerable resources toward review of 10-Ks and all first time registrations, Kile (2002); SEC (2004, p. 62). Firms can face considerable costs if inaccurate, misleading or incomplete disclosures cause delays in the registration of new securities or the refilling of financial reports, Hertz (1997). Third, the disclosure is precise and transparent because the SEC requires firms to uses clear, unobtrusive language to describe the firm's business model. Fourth, the SEC requires firms to include discussion of customers, markets and methods of sales and distribution in its discussion of the products and services the firm offers. Finally, the links to publicly available SEC filings allow for verification and replicability of our classifications.

Population of Firms

Analysis is conducted on firms listed in the 2001 Center for Research in Security Prices (CRSP) database with firm identification codes (CUSIPS) originating on or after 1/1/1996, the date on which SEC filings through its online electronic data gathering reporting system (EDGAR) were made mandatory. (See gsbwww.uchicago.edu/research/crsp/; also see www.cusips.com for information about the structure and uses of CUSIPS numbers.) From this population of 4,431 firms, 362 firms are excluded because they are domiciled outside the United States, and as such, are not required to provide the disclosures necessary for this analysis. An additional nine CUSIPS are duplicate listings of the same firm. Another 584 firms are eliminated because they were mutual funds or investment companies with no other operations. Finally, eight firms are eliminated because no SEC filings containing the firm's business description could be found. The final data set contains 3,468 useable firms.

Procedures Employed to Identify Internet Firms

Procedures for identifying Internet firms from our sample begin with the location of each firm's Description of Business and transfer of the disclosure into an Access database. This allows the key words "Internet", "online", "web", "e-commerce", "e-tail", and "e-business" to be highlighted as they occur in the description. Descriptions are then carefully read, noting all disclosures pertaining to the firm's products, services, customers, methods of transacting sales, and methods of delivering the products or services. If a firm makes no mention of the Internet in connected with its process for generating revenue, the firm is classified as "not an Internet firm" and receives an Internet code of "0". If the firm's revenues are entirely dependent upon the Internet, the firm is classified as "exclusively an Internet firm" and receives an Internet code of "3". In all remaining instances, further analysis is required to distinguish whether a firm receives an Internet code of "2", indicating that Internet accounts for the largest segment of the firm's revenues, or "1", indicating that the Internet accounts for a material, but secondary source of revenues. This additional analysis includes in sequence (1) investigation of whether the company disclosed an absolute percentage of sales derived from the Internet, (2) examination of the income statement and the footnotes to the financial statements (also required in all 10-Ks and registration statements) to determine if the company reported revenues derived from the Internet separately from other revenue and if necessary, (3) an assessment of the order and relative length of descriptions of Internet-based versus non-Internet-based revenue generating activities, under the assumption that firms discuss primary sources of revenue first and at greatest length.

Developing an Internet Business Model

Once all Internet firms are identified, step three requires the development of a comprehensive index to include a description of all business models employed by Internet firms. The initial index utilizes the taxonomy presented by Eisenmann [2002] as a foundation for identifying, organizing and categorizing Internet businesses.

Eisenmann's Internet Service Firms Business Model Classification

Eisenmann presents eight business models for firms that rely primarily on the Internet to facilitate the delivery of information, goods or services to end customers. Specifically, he identifies (1) Internet service providers, (2) Internet portals, (3) Internet content providers, (4) online retailers, (5) online brokers, (6) online market makers, (7) networked utility providers and (8) application service providers. Although these models provide a framework for articulating and organizing Internet business activities, the empirical nature of this paper requires the potential for expansion and reclassifying of business models as empirical observations dictate. Specifically, we examine the description of the business models of the firms classified as Internet firms and assign it to one of the eight Eisenmann classifications. If the firm's business model fails to match any of the Eisenmann descriptions, then the firm is placed into a new category and an appropriate business model

label and characterization of the firm's activities is developed. New classifications are examined to identify clusters of similar business models. These clusters are then refined to minimize the numbers of classifications while avoiding unwarranted aggregation of dissimilar business activities.

We develop a four-digit Internet business model identification code that provides unique identification and arrangement to each Internet business model that we define. Each digit of the code represents a subset of the digit preceding it (summarized in table 1). The first digit distinguishes whether the business model is an Internet business model (first digit = 1) or a business model that does not deploy the Internet (= 0). The second digit (= 1, 2, or 3) identifies the relation of the Internet to the firm's revenues. The third digit provides unique identification of observed business models, given the function of the Internet within the firm (the second digit). The final digit provides sub-classifications that yield greater specificity for distinguishing diversity within business models. Since the scope of this analysis is limited to Internet business models, all non-Internet business models are assigned a code of "0000".

First Digit – Distinguishes Internet business models from traditional business models
- 0 = not an Internet business
- 1 = Internet business model

Second Digit – Distinguishes Function of Internet within the model
- 1 = provides products and services to support Internet operations
- 2 = deploys Internet for delivery of products and services
- 3 = deploys Internet for transacting sales

Third Digit – Distinguishes Common Internet Business Designs
- 1 through N = the separately distinguishable business models that deploy the Internet by the means identified by the second digit

Fourth Digit – Provides Additional Specificity Within Business Designs
- 1 through N = additional specificity as needed

Table 1. Four-Digit Internet Business Model Index

Description of an Internet Firm

Our analysis identifies 18 unique three-digit level Internet business model classifications and 24 unique four-digit level Internet business sub-classifications. Table 2 presents a register of our four-digit Internet business model identification codes, a description of each business model, and examples of firms assigned to each code (described in the following section). The models incorporated from Eisenmann are labeled as such in the table.

Internet Business Model Index			
0000 – Not an Internet Business Model			
1000 – Internet Business Models -			
	1100 - Internet Business Models – Products and Services that Allow or Facilitate Internet Usage		
		1110 – Internet Service Providers (Eisenmann) - provide clients with an access to the Internet.	
			1111 – Internet Service Provider – no additional services – provides access to the Internet with minimal additional services (*Earthlink, Juno Online, At Home Corp.)*
			1112 – Website Hosting Service Provider – These companies provide access to the Internet on an outsourced basis *(Data Return, VCampus, Vialink Corp.)*
			1113 – Online Service Provider – connectivity and multiple services – provides connectivity or Internet hosting along with extensive other services (*Prodigy*)
		1120 – Communications Service Providers - own and operate the hardware and software to maintain Internet traffic. Comprised of providers of telecommunications, wireless, satellite and broadband services. *(World Com, Weblink, Universal Broadband Corp.)*	
		1130 – Information Technology Service Providers –facilitate in the development and implementation of client companies' Internet strategies, operations and applications.	
			1131 – Consulting – Internet advisory services - provides expert Internet advisory services to client companies. *(Renaissance World Wide, Fieldworks, Leap Net Corp.)*
			1132 – Outsourcing – Web design and Internet support services - provides Internet design and application hosting on behalf of client companies. *(Omega Orthodontics, Zomax, Global Sports Corp.)*
			1133 – IT Personnel Staffing – Internet support personnel – provides temporary or permanent personnel, who provide Internet support services on the client's premises (*Westaff Corp.*)
		1140 – Network Utility Provider (Eisenmann) - produce software to extend the capabilities of the browser. (*RealPlayer, Adobe Acrobat & Shockwave*)	

		1150 – Internet Advertising Services – provide advertising services to third parties that contract for them to collect consumer data, generate sales leads, create product awareness, and initiate consumer purchases through multiple marketing vehicles, including, banner advertising, pop-ups, targeted email solicitations, web site sponsorships and other online marketing services *(Coactive Marketing, Metromail, Engage Corp.)*
		1160 – Computer Hardware Manufacture – Server-level Internet support functions – manufacture hardware appliances that allow customers to perform critical Internet related. *(Net Wolves, Steel Cloud, Xetel Corp.)*
		1170 – Computer Software Developer – Internet support functions develop software that allows customers to perform critical Internet related applications
		1171 – Server – Level Software –develops and support open systems-based, mission-critical desktop system software and integrated applications that enable multi-platform deployment of client/server applications throughout an enterprise. *(Red Brick Systems,BEA Systems, Saga Systems Corp.)*
		1172 – Network Security – provide applications and related support services designed to enable their customers to conduct secured electronic communications, transactions and information exchange via the Internet; includes content filtering and Internet monitoring solutions. *(Raptor System, Soft Lock, World Talk Communications)*
		1180 – Miscellaneous Other Internet Support Services – Includes domain name registration services, Internet educational services, Internet trades show and event organizers *(Register, WJ Communications, Key 3 Media)*
	1200 - Internet Business Models – Digital Products and Services Delivered via Internet	
		1210 – Internet Portals (Eisenmann) - provide websites that become hubs for content, communication, community, and commerce on the Internet. Portals often provide entry point pages to the Internet with a hierarchical, topical directory and a search window.
		1211 – Horizontal Portals - provide services across multiple areas of interest (*Lycos, Yahoo).*
		1212 – Vertical Portals - provide multiple services across a single area of interest (*Sportsline.com, Garden.com).*
		1220 – Content Providers (Eisenmann) –principally engage in the delivery of copyrighted content by Internet. (*E College, Digital Generation System, Care Data Corp.)*
		1230 – Application Service Providers (Eisenmann) - provide software, on an outsourced (leased) basis from centrally hosted data centers via real-time access over high-speed networks *(Radiant System, Easy Link, Future Link Corp.)*
		1240 – Electronic Data Exchange – process electronic commerce transactions provide electronic data interchange, electronic funds transfer, file sharing, electronic document signing and e-Mail transactions *(Online Resources, Interactive Systems)*
		1250 –- Content Delivery Service Provider – route and efficiently distribute customer's content over the Internet (*Digital Island, Intervu, Akamai Technologies)*
	1300 - Internet Business Models – Sales Transacted via Internet	
		1310 – Online Retailers (Eisenmann) – transact sales of goods for which they take title. *(Web Financial, Nutri Systems, Focus Affiliates)*
		1320 – Online Brokers (Eisenmann) – act as an agent or intermediary to transact sales of goods on behalf of a limited number of clients, who retain title for the goods *(Dice Inc, Global Payments, College Link)*
		1330 – Online Market Makers (Eisenmann) - organize an Internet infrastructure in which unaffiliated buyers and sellers meet to transact sales according to "rules" established by the company, often auction type procedures. *(EBAY, Career Builder, Free Markets)*
	1400 – Internet Business Models – Services and Sales to Internet Firms	
		1410 – Network Hardware Manufacturer – manufacture hardware for communication service providers, other communication networks and Internet Service Providers. Their products become components of the Internet "backbone" *(Video Networks, Technology Service Group, Verilink)*
		1420 – Network Software Developer – develops software for communication service providers, large area and other communication networks and Internet service providers. Their products allow these customers to provide Internet protocol *(Voice Net, Delano Technology, Digital Transmission System)*

Table 2. Internet Business Model Index

Matching Internet Firms to Our Internet Business Model Index

- Step four of our five-step analysis requires assigning each of the 3,468 firms a business model code descriptive of the Internet's relation, if any, to the firm's business. Two characteristics distinguish the analysis from more standard procedures for classifying firms. First, the analysis places exclusive emphasis on the Internet, and its relation to the firm's process for generating revenue. Standard industry classification systems, such as SIC codes, concern themselves with a broader scope, rather than emphasizing a specific phenomenon, such as the Internet. A second characteristic of the classification process is that the classification entails a multidimensional analysis.

Since firms often devise multiple means of producing revenue, our matching procedure allows for both a primary Internet business model code and if applicable, a secondary business model code. The primary code provides a classification to describe the model that produces the greatest source of revenue to the firm. By definition, a firm that derives most or all revenues from the Internet (Internet code = "2" or "3") will have a primary business model code corresponding to one of the Internet business models (first digit = "1").

The following procedures help establish a replicable and reliable classification process.

- Business model descriptions are taken at face value. No inferences about the Internet's function within the organization are made based upon prior knowledge of a company or any information beyond that stated in the firm's SEC filing. (If a firm does not discuss its website or use of the Internet, then such usage is deemed immaterial to the firm's operations)
- Classification of firms with multiple revenue sources follows previously described procedures: first verifying any quantified segmentation of revenue, second, verifying any statements qualifying which business models provide greatest contribution toward revenue, third, applying the principle of first mention to infer that business models are discussed in order of greatest contribution to revenue, and fourth applying the principle of scale to infer that the amount of narrative devoted to a given business model is an indication of the model's contribution to revenue.
- Business descriptions are read and classified by both coauthors (most of them are read twice). A Masters of Information Systems graduate student independently classifies all descriptions. Any mismatches between the two classification iterations are reexamined and reconciled.

FINDINGS

The Integrated Internet Firm

One of the perceptions investigated in this study is that Internet firms are cleanly delineated from the population at large. Our findings are not consistent with this perception. Table 3 presents descriptive statistics of the variable "INTERNET", which measures the degree to which a firm's revenues are derived from the Internet. The bottom row presents the distribution of the Internet code for the entire sample. First of all, we note that a significant portion of firms derive at least the majority of their revenue as a result of the Internet (N=844 or 24%). Second, we note that of these 844 firms, 210 (25%) derive material amounts of revenue from other means. These numbers indicate that in reality, even firms that are designed to operate from an Internet business model often deploy other methods of transacting sales, delivering products or programs to sell to other product markets as an accompanying source of contribution. Of even more significance are 602 (23%) of the 2,624 firms that are primarily not Internet firms. These firms derive at least a material secondary amount of revenue from the Internet. Thus, in aggregate, 42% of our sample firms derived at least material amounts of revenue from the Internet, suggesting that the Internet business models we present are widely integrated into the U. S. economy and firms' broader business strategies.

			Degree to which Revenues are Derived from the Internet								
			Immaterial		Material		Primary		Exclusive		
			Internet = 0		Internet = 1		Internet = 2		Internet = 3		
PRIMARY SOURCE OF REVENUE			N	Pct.	N	Pct	N	Pct.	N	Pct	Total
0000 – Primarily not an Internet Business Model			1854		258						2112
	1100 - Products / Services for Internet Usage										
		1110 – Internet Service Providers					4	7%	52	93%	56
		1120 – Communications Service Providers	13	11%	60	50%	21	18%	25	21%	119
		1130 – Information Technology Service Providers	54	23%	64	27%	37	16%	78	33%	233
		1140 – Network Utility Provider					0	0%	7	100%	7
		1150 – Internet Advertising Services	9	19%	10	21%	0	0%	28	60%	47
		1160 – Computer Hardware Manufacture	45	26%	96	56%	20	12%	11	6%	172
		1170 – Computer Software Developer	36	13%	80	28%	48	17%	122	43%	286
		1180 – Miscellaneous Internet Support Services					3	43%	4	57%	7
	1200 - Products / Services Delivered via Internet										
		1210 – Internet Portals					4	11%	32	89%	36
		1220 – Content Providers					14	23%	48	77%	62
		1230 – Application Service Providers					4	9%	43	91%	47
		1240 – Electronic Data Exchange					3	18%	14	82%	17
		1250 –- Content Delivery Service					0	0%	6	100%	6
	1300 - Sales Transacted via Internet										
		1310 – Online Retailers					3	6%	45	94%	48
		1320 – Online Brokers					5	17%	24	83%	29
		1330 – Online Market Makers					4	11%	33	89%	37
	1400 –Services and Sales to Internet Firms										
		1410 – Network Hardware Manufacturer	8	11%	10	13%	28	37%	30	39%	76
		1420 – Network Software Developer	3	4%	24	34%	12	17%	32	45%	71
All Sample Firms			2022	58%	602	17%	210	6%	634	18%	3,468

Table 3. Primary Internet Business Codes by Revenues from Internet

Table 4 presents a highly aggregated view of how our Internet business classification maps into the existing Eisenmann taxonomy. The table also reveals the presence of three "super clusters" that emerge from our analysis but are exogenous to existing classifications. (Internet Business Model Frequencies and percentages in table 4 only include firms that derive the majority of their revenue from the Internet).

Classification	N	Pct.
1. Internet Service Providers (1110)	56	6.6%
2. Internet Portals (1210)	36	4.3%
3. Online Content Providers (1220)	62	7.3%
4. Online Retailers (1310)	48	5.7%
5. Online Brokers (1320)	29	3.4%
6. Online Market Makers (1330)	37	4.4%
7. Networked Utility Providers (1140)	7	0.8%
8. Application Service Providers (1230)	47	5.6%
All Eisenmann firms	322	38.2%
Network Providers and Network Equipment & Software Manufacturers (1120, 1410, 1420)	148	17.5%
Internet Support Service Providers (1130, 1150, 1180, 1240, 1250)	173	20.5%
Client/Server Internet Hardware and Software Manufacturers (1160, 1170)	201	23.8%
All Non-Eisenmann Internet firms	522	61.8%
All Internet firms	844	100%

Table 4. Internet Business Model Primary Codes

CONCLUSIONS

This study analyzes the business models of firms that derive their revenue from the Internet. Inferences from the financial press and prior research studies suggest that Internet firms are exceptional, homogeneous and possibly a transitional phenomenon. This analysis suggests that such views are inaccurate. The analysis indicates that Internet firms are common and diversified across a broad spectrum of business models. Further, even traditional non-Internet firms widely integrate the Internet into their broader business strategies.

The findings reveal several implications for future research. Our analysis employs data from 1996 through 2001 inclusive. Extending this analysis to include subsequent years would allow for investigation of the stationarity of our findings. Secondly, future research may wish to investigate the relation between Internet business models and firms' financial performance or viability over time. Other studies may wish to investigate the customer interactions underlying the revenue emphasis. Finally, the analysis suggests that references to Internet firms as a block may wish to consider the rich variation that exists among these firms.

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