Exceeding the Expectations of Today's Always-On, Always-Connected Student with Palm® Handhelds, Mobile Manager & Smartphones

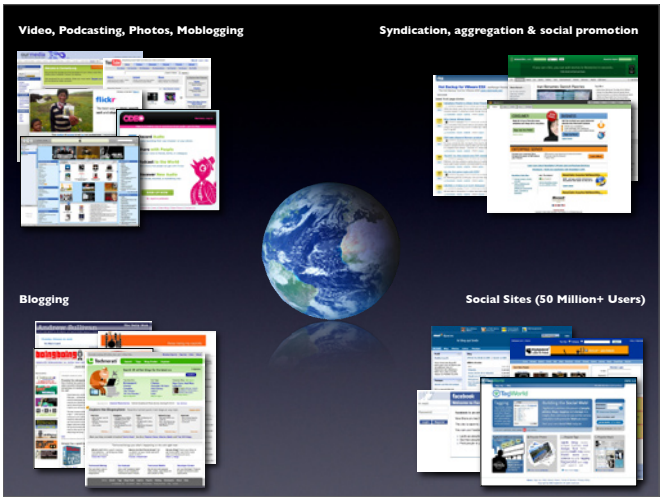
Attracting the best and the brightest, accelerating your rich learning environment, keeping your institution at the forefront of cultural and technological innovation, and doing all three as a competitive, cost efficient institution are goals of paramount importance in an internet-centric world. This white paper outlines the rise in demand for always-on connectivity and how Palm® wireless handhelds and smartphone technology meets and exceeds it. See how Palm® is leading the way.

Modern reality embraces a 24/7, always-on world where everything from research information to personal communication happens on-demand. This is true for many in the user community but is nowhere more clearly realized than within higher education. Here learners and educators are connected to the global internet on campus with laptops, with broadband connections at home and increasingly, with smartphones everywhere.

This group relies on the internet not only to stay current on classroom assignments, emerging research and news, but also to interact and stay connected socially, to search, purchase, create, consume and play. Because they live a constant on-line lifestyle, their expectations for on-line experiences are always rising. Having knowledge and information accessible at the touch of a button—anywhere, any time, with any operating system or device and *fast*—is a base-line assumption. Being connected means to live a better, more efficient life.

No wonder both educators and especially students are in a perpetual search for the next best hardware and software. They are not reluctant to abandon one platform or device for another if it does more, goes faster or even simply has better and more pleasing design.

Exploring the habits and assumptions driving this population's use of on-line devices reveals that students and faculty are participating on the internet in new and fundamentally different ways. Understanding the Hows and Whys of that behavior will help you to inform your strategic planning scenarios and meet the imperatives of tomorrow. Translating information about today's trends into forecasts can inspire the creation of targeted adaptations that will build on your established, competitive advantage in the education arena.



Numerous next generation participatory internet offerings have created demand for always-on connectivity

Wireless handhelds and smartphones in the hands of your students and faculty are already changing the paradigm of access, but there is more than mere email, casual web browsing or picture taking going on. As you'll see, our culture is changing and the impact on what you offer today and tomorrow will be profound.

The World in Your Hand: Rise of Participation Culture

The term Participation Culture suggests opportunities for individuals to share information and insights, or to develop solutions for issues of all kinds. This is exactly what the Participation Culture is about. But different from town hall forums and roundtable discussions, there is no limit on the number of participants in this virtual conversation. Not only that, but everyone gets an equal voice, people of like minds can wander off to focus on a sub-set of the topic, and all of this can be taking place at once. The opportunity to play a part—to teach, learn, have your say or blow off steam at will—is another reason why access to always-on connections has become a must-have feature for modern living.

Two factors, equal in importance, are at the heart of the Participation Culture's existence and rapid spread: an impressive increase in wireless broadband speed and an equally dramatic decrease in the cost of

using it. These elements have combined to build the critical mass of users necessary to establish a multitude of hosted offerings for social software, blogging, moblogging and other Participation Culture phenomena.

As students and faculty members seek and obtain always-on connections to the internet—attracted by the reach and escalating usefulness of the global internet—the network effect makes their participation increasingly useful and more powerful. The network effect causes a good or service to have a value to a potential user dependent on the number of users already owning that good or using that service.

Robert Metcalfe, inventor of Ethernet, once observed that the total value of a good or service that possesses a network effect is roughly proportional to the square of the number of customers already owning that good or using that service. Known as Metcalfe's Law, this line of reasoning provides a way to view and thus understand the returns people achieve from their energy, effort and attention investments (i.e., their participation) in to internet-centric, hosted applications.

Social Software

When students want to rendezvous, connect or collaborate with others, they no longer limit themselves to conventional methods like phone calls or all-night study sessions. Instead, they are choosing to text message, share photos and use a myriad of social software—and an always-on connection—to stay in touch.

This desire for connectedness is not reserved for times at home or in the dormitory. It is just as prevalent when students head to campus. This is a paradigm shift. More importantly, this behavior is accelerating, compliments of an explosion of easy-to-use applications and technologies that increase the number of reasons to be on-line. Examples include:

- Instant Messaging
- Internet forums (formerly known as bulletin boards)
- Blogs or Weblogs (online journals)
- Wikis (editable web pages)
- Social network services (e.g., Friendster, Tribe.net as well as the fifth most trafficked site on the internet, MySpace, with more than 60 million users)
- Social bookmarking (online sharing of bookmarks for others to search or use)
- Social Citations (for academics to place citations online)
- Social Libraries (sharing of information surrounding owned content)
- Social Shopping Applications (social recommendations)
- Social News (submission of news articles and subsequent promotion. E.g., Digg)
- Peer-to-peer social networks (e.g., Wirehog, iMeem)
- Collaborative editing (e.g., Writely online word processor; Foldera for project management)
- Virtual presence and Massively-Multiplayer Online Games (MMOGs) (e.g., SecondLife, World of Warcraft).

While many types of social software are taking hold fast, a few merit special mention. Blogging tops the list. Blogging has experienced a meteoric rise fueled by a broad range of post topics coming from everyone from credentialed journalists to average Joes. According to Dave Sifry, CEO of the blog-tracking and search site Technorati, the number of blogs available on the internet is doubling every five months. With tens of millions of blogs tracked by Sifry's company currently, blogging has become a major social phenomena whose impact is being felt in both mass and personal communications.

Digital cameras and social tagging of photos via sites like Flickr or WebShots has enabled participatory photo clustering, identification of and tagging of people within a photo, and sharing of these images with others. This phenomena—coupled with blogging—is informing, connecting and entertaining people as never before. Combining wireless handhelds and smartphones with built-in cameras—together with blogging—has spawned a sub-blogging behavior termed "moblogging" (combination of *mo*bile and *blogging*) which has become one of several key drivers behind the rapidly growing adoption of wireless enabled handhelds and robust smartphones.

Web as the New Normal

The Pew Internet & American Life Project produces reports that explore the impact of the Internet on families, communities, work and home, daily life, education, health care, and civic and political life. Funded by The Pew Charitable Trusts, the Project aims to be an authoritative source on the evolution of the Internet through collection of data and analysis of real-world developments as they affect the virtual world. Pew Internet has several studies that illustrate the cultural shifts occurring as participation on the internet accelerates:

According to their study, "Generations Online," *internet users ages 12 to 28 years old have embraced the online applications that enable communicative, creative, and social uses. Teens and Generation Y (age 18-28) are significantly more likely than older users to send and receive instant messages, play online games, create blogs, download music, and search for school information.*

Their follow-on study, "Internet Evolution" (7/2005) states in part: *The Web has become the "new normal" in the American way of life; those who don't go online constitute an ever-shrinking minority. And as the online population has grown rapidly, its composition has changed rapidly. At the infant stage, the internet's user population was dominated by young, white men who had high incomes and plenty of education. As it passed into its childhood years in 1999 and 2000, the population went mainstream; women reached parity and then overtook men online, lots more minority families joined the party, and more people with modest levels of income and education came online.*

Pew's study, "The Internet at School" (8/2005) abstract states, *The most recent Pew Internet Project survey finds that 87% of all youth between the ages of 12 and 17 use the internet. That translates into about 21 million people. Of those 21 million online teens, 78% (or about 16 million students) say they use the internet at school.*

Their most recent study "Family, Friends & Community" (11/2005) clearly articulated the participation trend: *American teenagers today are utilizing the interactive capabilities of the internet as they create and share their own media creations. Fully half of all teens and 57% of teens who use the internet could be considered Content Creators. They have created a blog or webpage, posted original artwork, photography, stories or videos online or remixed online content into their own new creations.*

This Participation Culture is growing. As a result, the number of internet users continually searching for ways to be connected at all times is doing likewise. Immediacy is the driver. Waiting until they get to their residence with broadband access, getting connected wirelessly with a laptop on campus or in the occasional coffee shop sporting free Wifi access, is becoming less desirable.

The World in Your Hand: Content Now Comes to You

Push email has become a popular option for automatically receiving communications when emails arrive at the mail server. With participation occurring all over the internet and within a multitude of hosted offerings, it's becoming increasingly desirable to be automatically notified when something changes online.

Whether it's a comment added to a blog or social site, a new moblog photo posted by a friend, or an invitation to an event, there is an explosion in notification choices which, yet again, is accelerating demand for smartphones that can receive data and notifications in a variety of formats.

Developed in the nineties and refined over the last several years, Really Simple Syndication (RSS) is a format that some have termed the "lubrication for the gears of the Web". RSS is a protocol specified in extensible markup language (XML) and used for Web syndication of content via feeds.

RSS is important because it enables news websites, weblogs, podcasting and more. It can also be a highly efficient and cost effective means of campus-wide, governmental or parental automatic notifications.

There are many RSS news readers available for Palm smartphones. With options for downloading during HotSync, or live via their always-on direct internet connection, these news readers are changing the way more and more smartphone users stay aware and in touch at all times, regardless of where they are.

Many RSS readers have support for embedded images, attachment support, search and other quite useful capabilities. For the user it is an easy and efficient way to view and consume more information than ever before. It also allows them to keep on top of changes to any place online they're participating in or otherwise engaged.

Most germane to your strategic planning is the use of RSS by all of your constituents for subscribing to user-specific, highly targeted and varied institutional feeds. This enables, for example, a student to subscribe to any feed which, in turn, allows them to track and view online changes in near real-time. One example of RSS use in higher education can be seen at University of Minnesota Libraries. Their feeds include:

- News from the Libraries (and the Libraries Blog)
- Recently added Resources (Libraries wide)
- Events at the University Libraries
- Recent additions to UThink (UThink is a blogging platform available to the faculty, staff, and students, and is intended to support teaching and learning, scholarly communication, and individual expression)
- Both broad subject feeds (e.g., Arts and Humanities) or Specific Subject Feeds (e.g., Art & Art History, Asian).

The U of MN campus newspaper (The Minnesota Daily) offers an RSS feed. The Graduate School site offers a feed. UMNnews has a feed for their university wide announcement site. SafeComputing (I.T. news and information) has a feed and so on.

The adoption of, and innovation surrounding RSS is significant. RSS is being leveraged by software companies, open source advocates, entrepreneurs, mainstream media, and others who are vying for the *attention* of users or meeting their *intentions* to obtain what is being delivered by subscribing to content delivered by an RSS feed. Web applications, RSS aggregators and other new models of content delivery are all being enabled by this amazingly simple and straightforward XML format.

Audio and video subscribing and downloading via the internet (dubbed "podcasting") is a phenomena which is illustrative of the power of RSS and how already existing technologies and capabilities have been streamlined, connected and become closed-loop due to this format. This emergent technology not only enables content coming to your wireless handheld, smartphone or PC, but also has been the catalyst for this rapidly growing new method of audio communication.

Podcasting exploded on to the scene in 2004 facilitated by the availability of the RSS format. Dave Winer (software pioneer and key shepherd of the RSS format) along with Adam Curry (internet entrepreneur and former MTV vjay) created a "catcher" program to take internet available mp3 files, wrap them in a subscribable "feed", and deliver these files directly to the user's computer or a "catcher" program (e.g., RSSRadio, Juice, Podcatcher or iTunes).

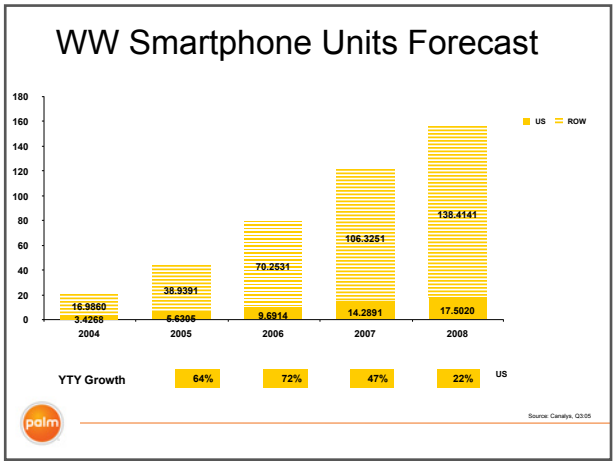
In years past, web sites with audio files have offered direct download of their audio files. The subscribable RSS feed has been a powerful approach and enabled automatically delivered new content. This is what distinguishes a podcast from a simple audio file download or audio streaming.

Today there are over 15,000 podcasts, businesses offering podcasting for communication and training, and institutions of higher learning using it for constituent communications.

Several categories of podcasts are already offered by universities such as Stanford, Drexel, Georgetown and others:

- News broadcasts and institution leadership communications
- Recruitment and alumni information
- Recorded lectures and educator notes
- Student projects
- Sports recordings and more.

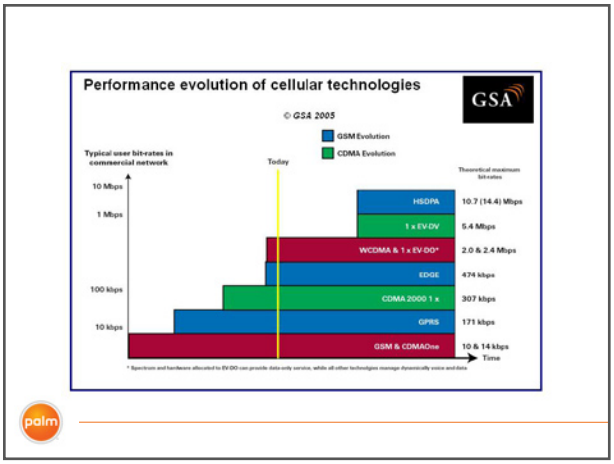
Podcast support for Palm wireless handhelds and smartphones is strong. An example of an RSS application with built-in podcast support is Quick News for PalmOS® by StandAlone, Inc. This useful RSS reader facilitates subscribing to a podcast through any of the numerous podcast directories or via your university podcast feed. This application automatically downloads subscribed podcasts and stores them on industry-standard MultiMediaCard or SD expansion cards within the smartphone itself. This application works in conjunction with the built-in smartphone media player and allows playback of a podcast MP3 audio file directly on your Palm smartphone.



The World in Your Hand: Mobility and Always Connected

Your students and faculty already are—and will continue to in increasing numbers—be carrying their primary internet access devices on their belt, in a pocket or purse, and in the form of wireless handhelds or always-on and always connected smartphones.

The late Mark Weiser of the Xerox Palo Alto Research Center (PARC) wrote what is perhaps the seminal paper in 1988 on Ubiquitous Computing (ubicomp). It's central point was that computing would increasingly be integrated into the fabric of everyday life instead of computing being performed with a computer as a distinct object. One of the key evolutionary steps along the path toward ubicomp is widespread and ubiquitous connectivity. Wireless local area networks (WLAN) on campus achieve one key aspect of ubicomp and carrier-based networks carry this notion to a much wider geography.



Wireless LAN's have been deployed on the vast majority of campuses in North America. According to Market Data Research (a Dun & Bradstreet Company) in its research report, *The College Technology Review, 2005-2006 Academic Year*, wireless networks are available on 86% of the nation's campuses—nearly double the rate first reported five years ago.

Wifi-enabled Palm® handhelds or mobile managers provide students and faculty with campus wide, WLAN access in easy to use, rich application-based and always available devices.

Palm® smartphones provide both on-and-off campus access with a signficantly greater footprint of coverage coupled with seamless roaming use. Growth in both smartphone capability—while expanding network bandwidth becomes faster and more affordable—is spurring adoption at a greater rate.

In a May, 2005 Forbes magazine cover story, "Coming Soon to a Screen Near You", one paragraph summed up the opportunity smartphones represent and why adoption rates are continuing to accelerate: *Always on and always with you, the cell phone is the most personal and ubiquitous gadget ever devised; 1.5 billion are in use worldwide, and last year 690 million were sold, six times the number of PCs and laptops. Suddenly this high-tech talisman is morphing into something even bigger–a futuristic entertainment system and the most exciting new tech platform since the Internet. Wireless carriers send ever larger chunks of data ever faster across the airwaves. Makers pump out phones with bigger screens, 3-D graphics chips and lush digital sound and video. Newly inspired entrepreneurs and entertainment titans alike are in a mad rush to develop songs, graphics, games and videos to light up millions of teensy screens.*

Forbes continues, "*Carriers are beginning to see the benefits of the superphone. At Sprint PCS, 8 million of its 26 million subscribers now use data services. Last year they swapped 300 million photos, spending an average of $6 per month–an extra 10% of their bill–on top of voice charges. Verizon's 16.6 million wireless data customers (of 43.8 million subscribers total at the end of 2004) spent $1.1 billion last year, more than double the level in 2003, to get 100 million picture messages and 100 million downloads. Research firm In-Stat says the major U.S. carriers will be spending almost $20 billion in two to three years upgrading to next-generation networks to support all these newfangled services. They have little other choice, given that prices on pure voice services keep going down.*"

Growth in smartphones worldwide is expected to jump from 5.7M units (11.1M in North America) in 2005 to 156.2M units (37M in North America) by 2008 (see *WW Smartphone Units Forecast*).

Mobile networks continue to increase in bandwidth while pricing continues to become more balanced. Today's GSM & CDMA networks are already being supplanted by the significantly faster, third generation (3G) networks that deliver robust and fast theoretical maximum bit-rates: CDMA 2000 (307kbps); EDGE (474kbps); WCDMA/EV-DO (2.0 & 2.4Mbps) and the emerging HSDPA (10.7 Mbps) (see *Performance evolution of cellular technologies*).

Attracting customers to the growing and soon to be built-out 3G networks is a marketing challenge already being addressed by the mobile carriers. With significant and ongoing investments in these robust and fast networks, all carriers are striving for just the right balance of speed, capability, price and coverage. Given the rapid adoption curve of smartphone technologies, these carriers recognize the opportunity to provide connectivity to a growing participatory user community that demands to be always-on, always connected.

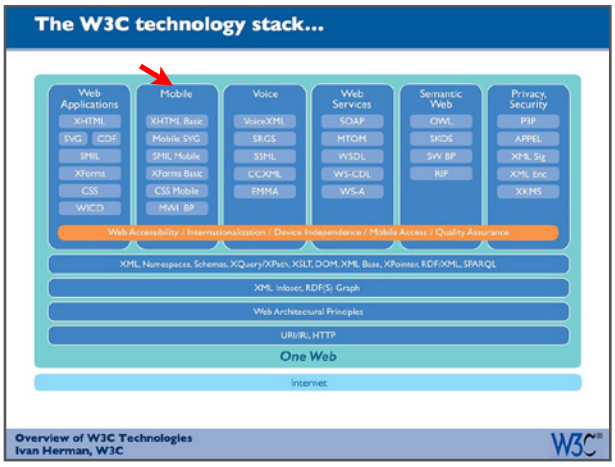
The majority of current and potential US mobile customers will have access to high-speed 3G networks with pricing deltas not significantly above current, voice-only plan costs.

The Web Technology Layer

Recognizing the worldwide acceleration in smartphone adoption and that people around the world are increasingly interested in always-on connectivity, the World Wide Web Consortium (W3C) announced a Mobile Web Initiative in 2005. It's mission: to make Web access from a mobile device as simple as Web access from a desktop device.

"*The Mobile Web Initiative's goal is to make browsing the Web from mobile devices a reality,*" explains Tim Berners-Lee, W3C Director and inventor of the Web. "*W3C and mobile industry leaders are working together to improve Web content production and access for mobile users and the greater Web.*"

Web on Everything is a goal that fits squarely within the mission of the W3C. That's why it was the genesis behind making mobile a key part of the Web technology stack. As such, the building blocks for the future of smartphone—upon which all software, infrastructure and device vendors can deliver their respective offerings – are in place or being implemented.



Mobile is one of the six key pillars of the World Wide Web stack

One of W3C's goals is to design technology that will work independently of a particular hardware platform. Increasingly, people are seeking access from a range of devices that extend beyond the familiar desktop computer. This includes mobile telephones, kiosks in airports, kitchen appliances and automobiles. Access from these devices (whether by human or machine) should be as simple, easy and convenient as Web access from a home computer. W3C is designing technologies that will lower obstacles to authoring for, and browsing with, devices having a broad range of input and output capabilities. In the handheld device world, as part of the Mobile Web Initiative, W3C is building a database of device descriptions and developing best practices for the creation of mobile-friendly Web sites.

The result of these global, Web technology standards is that your institution can comfortably embrace smartphone adoption and technologies with the assurance that software, infrastructure and the growing availability of mobile-specific offerings will continue to grow and add value to your strategic decision.

The World in Your Hand: Why Palm® Smartphones

Palm® TX™, Lifedrive™ handhelds and Treo™ smartphones seamlessly combine a full-featured mobile phone with either a PalmOS™ or Windows Mobile® organizer and PDA with wireless communications including email, messaging and web browsing[1], in a small, compact, yet easy-to-use device that simplifies both business and personal life.

Palm is the handheld market leader in areas such as mobile business, healthcare, education and government. The Company will continue to extend that lead by delivering compelling business and enterprise mobile information-management solutions, business-focused hardware and software products, robust service and support, and innovative market-leading alliances with developers and solutions providers.

From the power of the device to the speed of the mobile network, Palm smartphones deliver everything you need in higher education without compromise. Because of the wear and tear laptops undergo, the replacement cycle for notebooks can run about two years, more frequent than the three to four-year replacement cycle of desktops. Smartphones are a less expensive yet significantly more durable device and are always with your learners or faculty members wherever they go.

Solutions make the difference in higher education and especially to those opting to participate in today's online culture. With hundreds of applications in the areas of personal productivity (e.g., Acrobat, Microsoft Office, Organizer), RSS readers, rich media players, ebook readers and many more, there are innumerable ways to streamline your current processes and enable new ones while meeting the needs of the new, emerging online participant.

Palm, Inc. is focusing a significant number of resources on smartphones, a globally growing product category. Smartphone

[1] An Internet service provider account, data service and carrier subscription may be required

products require careful integration of several key features: voice, personal information management, or PIM, digital content and messaging. Palm brings a unique perspective to this market, combining mobile computing and communications capabilities. To help drive smartphone adoption, Palm intends to expand the number of smartphones offered, broaden and expand carrier relationships, particularly internationally, work closely with application providers to optimize the Palm device platform for wireless applications and market smartphone solutions to the installed base of handheld computing users.

Conclusion

Our culture is changing in to a participatory, on-line one and the impact on what you offer today and tomorrow must adapt to these new realities. Providing always-on access is key to:

- Meeting and exceeding the participation expectations of your students and faculty
- Delivering more efficient and targeted information to a precisely defined, opt-in audience of subscribers
- Discovering new opportunities to be increasingly relevant to today's connected constitutent.

While robust Wifi infrastructure has provided your campus with significant mobility and campus-centric ubiquitous computing capability, today's campus-only wireless internet access cannot fully meeting the demands of this—or the next generation—of students. Nor are portable, bulky laptops (with expensive acquisition and replacement costs) the form factor students will carry with them while on-the-go.

Palm handhelds, mobile managers and the growth in mobile smartphone capability -- along with the increase in network bandwidth and its simultaneous steadily decreasing cost -- expectations by your students, faculty and other constituents are increasing demand for access to knowledge, social connections to others, and ways to be a part of the rapidly emerging participatory culture that the internet and digital tools are enabling.

The Palm Connected Campus can provide you and your institution with the means and conduit to reach students and faculty in new, more profound ways while providing you with increased competitive advantages. Consider building Palm smartphones in to your strategic deployment plans and as a requirement for students and faculty. The payoff and benefits to a Palm® Connected Campus await you.

About Palm, Inc.

Palm, Inc., a leader in mobile computing, strives to put the power of computing in people's hands so they can access and share their most important information. The company's products for consumers, mobile professionals and businesses include Palm(R) handheld computers, Palm Treo(TM) smartphones, Palm LifeDrive(TM) mobile managers, as well as software, services and accessories.

Palm products are sold through select Internet, retail, reseller and wireless operator channels throughout the world, and at Palm Retail Stores and Palm online stores (http://www.palm.com/store).

More information about Palm, Inc. is available at http://www.palm.com.

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