Contractual mobility in communication networks

Gabriele Corliano   Bob Briscoe   Kashaf Khan

BTexact Technologies Research
Adastral Park, Martlesham Heath
Ipswich, Suffolk IP5 3RE, UK

Intrinsic to the current roaming model in mobile communications is that users may have to be served by the competitors of their chosen provider in order to experience seamless service. But user needs and technical capabilities evolve with time; to ensure survival of those services that are fittest to meet evolving needs is the traditional role of a competitive market. However, the current roaming model requires innovative new services to be standardised across competitors. Hence, the very fact of the topology of this model seems in pathological tension with market innovation.

The systems specifying the business interface between roaming users and access providers were set in stone by public cellular operators before their investment to realise the service. As new technologies enter the market [1], the roaming model is spreading unchallenged. The mobile industry urgently needs a solution to this fundamental tension, before the current model is built in to wireless LAN roaming systems. Rather than considering the unpredictability of the outcome of economic tussles [2] – caused by the operation of players with evolving and conflicting interests – a single outcome is being encoded into the business interface, turning a circumstantial commercial model into the model – hence reducing its evolvability.

Aware of the dangers of solving every problem in computer science by adding a layer of indirection (D.E. Knuth), we propose just that: a common policy interface to an intermediary *role* that manages business interactions with providers on behalf of users. This requires five new capabilities, which we have implemented in a prototype:

- Automated service offer dissemination to customers [3]

- Automated policy-based offer selection [4,5,6,7]

- *Ad hoc* establishment of per-session business relationships

- Dynamic offer-driven re-configuration of metering systems

- Multiple business relationship management

Users will not be wedded anymore to particular tariffs or service offers, but only to what they get and what they pay. The new interface – not encoding any specific commercial model – will represent the playing field for economic tussles, where existing and future commercial models will be realised, and the fittest will survive. The concept of a Personal Router [8] is a clear example of a device forming the focus of all the user-side processing and control. However, we present it as a model within a spectrum of alternatives where different players take on all or most of the above capabilities.

Our proposals seem to herald far more intense competition in the market, yet we argue that these building blocks do not necessarily need to be composed into an open roaming model. So, incumbents need not feel threatened by standardisation of the required interfaces and protocols. Closed models (like the current one) can and will be realised. However, building closed models from open parts allows these to be re-arranged later in different ways, as market and technology evolve. Ultimately, we argue this new model will be able to fully realise the potential of the mobile communications market, whereas the old roaming model will lead to stagnation long before full potential is reached.

REFERENCES

[1] W. Mohr and W. Konhauser, "Access network evolution beyond third generation mobile communications," IEEE Communications Magazine, December 2000.

[2] D. D. Clark, K. R. Sollins, J. Wroclawski, R. Braden, "Tussle in cyberspace: defining tomorrow's Internet", Proc. ACM SIGCOMM '02, Computer Communication Review, 32(4), August 2002.

[3] O. Heckman and V. Darlagiannis and M. Karsten and B. Briscoe. "Tariff Dissemination Protocol", Internet Draft, Internet Engineering Task Force, URL: http://www.m3i.org/papers/draft-heckmann-tdp-00.txt, March, 2002 (Expired)

[4] P. Faratin, J. Wroclawski, G. Lee, S. Parsons, "The personal router: an agent for wireless access", AAAI Fall Symposium, November 2002

[5] J. Altmann and P. Varaiya. INDEX project: user support for buying QoS with regard to user's preferences. 1998 Sixth International Workshop on Quality of Service (IWQoS'98), pp. 101-104, 1998. URL: www-networking.eecs.berkeley.edu/~altmann/publications/pricqos7_cr.ps.gz

[6] D. M. Kreps. Notes on the Theory of Choice. Westview Press, Boulder, 1988

[7] N. R. Jennings, P. Faratin, A. R. Lomuscio, S. Parsons, C. Sierra, and M. Wooldridge. Automated Negotiation: Prospects, methods and challenges. International Journal of Group Decision and Negotiation, 10(2):199-215, 2001.

[8] D. D. Clark, J. T. Wroclawski, "The Personal Router whitepaper". Technical report, MIT, URL: http://www.ana.lcs.mit.edu/anaweb/PDF/PR_whitepaper_v2.pdf, March 2000. v 2.0.

BIOGRAPHIES

Gabriele Corliano holds a MSc in Computer Engineering from Polytechnic of Turin, gained in October 2000. In July 2000, he also gained a diploma in Telecommunication Engineering from Eurecom Institute (Sophia Antipolis, France). He has worked for Motorola in the domain of Personal Communications. As a software designer, he first participated in the design of end-to-end IP over EDGE communication systems; and then, in the design of GSM – UMTS dual mode cell reselection. He joined BTexact Technologies Research in June 2001. Working in the Edge Laboratory as a research scientist, he carries out research in the domain of technical and contractual mobility in next generation communication networks.

Relevant citations

G. Corliano, K. Khan, "Economic tussles in the public mobile access market", BT Technology Journal, July 2003.

Bob Briscoe joined BT in 1980 and now leads the Edge Lab, one of the Research Labs of BTexact Technologies. In the late-1980s he managed the transition to IP of many of BT's R\&D networks and systems. In the mid-1990s he represented BT on the HTTP working group of the IETF and in the ANSA distributed systems research consortium, which led to the creation of the OMG and CORBA. In 2000 he initiated and was technical director of the Market Managed Multi-service Internet (M3I) consortium, a successful European collaborative project investigating the feasibility and user acceptability of controlling Internet quality on fast time-scales through pricing. His published research, standards contributions and patent filings are in the fields of loosely coupled distributed systems, scalable network charging and security solutions (esp. multicast), managing fixed and wireless network loading using pricing and on the structure of communications markets. He is also studying part-time for a PhD at University College London.

Relevant citations

Bob Briscoe, Vasilios Darlagiannis, Oliver Heckman, Huw Oliver, Vasilios Siris, David Songhurst, and Burkhard Stiller. A market managed multi-service internet (M3I). Computer Communications, 26(4):404--414, February 2003.

Vasilios A. Siris, Bob Briscoe, and Dave Songhurst. Economic models for resource control in wireless networks. In Proc. 13th International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC 2002), URL: http://www.ics.forth.gr/netlab/wireless.html, September 2002. IEEE.

Vasilios A. Siris, Bob Briscoe, and Dave Songhurst. Service differentiation in third generation mobile networks. In International workshop on Quality of future Internet Services (QofIS'02), volume 2511, pages 169--178, URL: http://www.ics.forth.gr/netlab/wireless.html, October 2002. COST263, Springer LNCS.

Oliver Heckman and Vasilios Darlagiannis and Martin Karsten and Bob Briscoe. "Tariff Dissemination Protocol", Internet Draft, Internet Engineering Task Force, URL: http://www.m3i.org/papers/draft-heckmann-tdp-00.txt, March, 2002 (Expired)

Bob Briscoe (Ed.). M3I architecture. Deliverable 2, M3I Eu Vth Framework Project IST-1999-11429, URL: http://www.m3i.org/, July 2000.

Bob Briscoe (Ed.). M3I pricing mechanism design; Price reaction. Deliverable 3 Pt II, M3I Eu Vth Framework Project IST-1999-11429, URL: http://www.m3i.org/, July 2000.

Jérôme Tassel, Bob Briscoe, Mike Rizzo, and Kostas Damianakis. Intelligent client based charging middleware. In Proc. 6th International Conference on Intelligence in Networks (ICIN 2000), URL: http://more.btexact.com/projects/mware.htm, January 2000.

Mike Rizzo, Bob Briscoe, Jérôme Tassel, and Kostas Damianakis. A dynamic pricing framework to support a scalable, usage-based charging model for packet-switched networks. In Proc. Int'l W'kshp on Active Networks (IWAN'99), volume 1653, URL: http://www.btexact.com/projects/mware.htm, February 1999. Springer LNCS.

Bob Briscoe, Mike Rizzo, Jérôme Tassel, and Konstantinos Damianakis. Lightweight, end to end, usage-based charging for packet networks. In Proc. IEEE Openarch 2000, pages 77--87, URL: http://more.btexact.com/projects/mware.htm, March 2000.

Bob Briscoe. The direction of value flow in connectionless networks. In Proc. 1st International COST264 Workshop on Networked Group Communication (NGC'99), volume 1736, URL: http://www.btexact.com/projects/mware.htm, November 1999. Springer LNCS. (Invited paper).

Bob Briscoe. The direction of value flow in multi-service connectionless networks. In Proc. International Conference on Telecommunicatons and E-Commerce (ICTEC'99), URL: http://www.btexact.com/projects/mware.htm, October 1999.

Jérôme Tassel, Bob Briscoe, and Alan Smith. An end to end price-based QoS control component using reflective Java. In Proc. 4th COST 237 workshop, URL: http://www.btexact.com/people/briscorj/papers.html#QoteS, December 1997. Springer LNCS.

Kashaf Khan obtained a BEng in Computers and Networks from the University of Essex in 1997. He then joined BT and has been working on research projects in the field of distributed systems since then. These include virtual reality worlds, multicast middleware and component-based Internet services. He is currently working in the field of beyond 3G network access systems.

Relevant citations

G. Corliano, K. Khan, "Economic tussles in the public mobile access market", BT Technology Journal, July 2003.