26 Easier to connect calls during disaster congestion

- Control to induce voluntary reduction of call duration -

Abstract

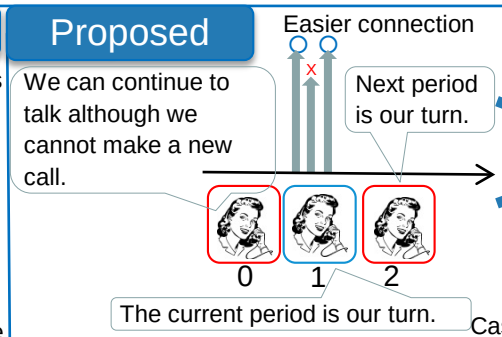
Voice call is still one of the most important means of communication in the aftermath of a disaster. However, there is the problem of low call-completion ratio. We propose a control to reduce congestion by restricting the period during which users can make a call according to their phone numbers, and by informing them this restriction. It achieves a higher call-completion ratio because of the smaller number of users to make a call. Furthermore, we found through our experiments that it enables users to reduce their communication demand (holding time) voluntarily and gives less stress to them than the conventional control. We plan to reduce disaster congestion in a way that accords with human psychology.

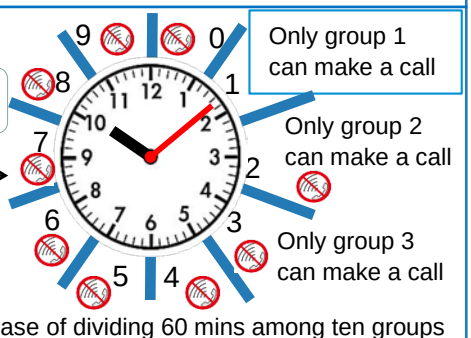
Proposed control

- Make groups by using the last subscriber phone number. (each group is almost the same size [1].)
- Assign a group a specific time within a certain period.
- Only the assigned group can make a call within the period and all users can receive a call anytime.
- No limit of holding time.

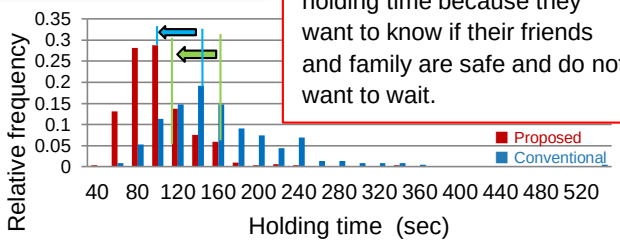
Conventional

Proposed





Reduction



Users voluntarily reduce their holding time because they want to know if their friends and family are safe and do not want to wait.

Mode: 30% reduced (140 s→100 s) [2]

Average: 30% reduced (161 s→111 s) [2]

Total load

0.1 (Number of users) × 1.33 (arrival rate)

= 0.133 > 1/10

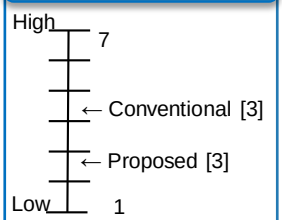
Traffic intensity = arrival rate × holding time

= 0.133 × 0.691

= 0.092 < 1/10

Call intensity with the proposed control is smaller than that with the conventional control.

Stress



Reference

[1] D. Satoh, H. Kawano, and Y. Chiba, "Effect of Load-balancing against Disaster Congestion with Actual Subscriber Extension Telephone Numbers," *IEICE Transactions, E98-A(8)*, pp. 1637-1646, 2015.

[2] D.Satoh, Y. Takano, R. Sudo, and T. Mochida, "Effect of Voluntary Control against Congestion during Disaster," *IEICE Technical Report*, Vol. 115, No. 130, CQ2015-36, pp. 87-92, (in Japanese) 2015.

[3] R. Sudo, D. Satoh, Y. Takano, and T. Mochida, "Examination of the Measures and Subjective Stress of Calling Party during Disaster," *Proceedings of the 79th Annual Convention of the Japanese Psychological Association*, p. 292, , (in Japanese) 2015.

Contact

Daisuke Satoh Traffic Engineering Group, NTT Network Technology Laboratories
Email : satoh.daisuke(at)lab.ntt.co.jp