

A Robust Inter-Domain DDS Gateway based on Token Passing for Large-Scale Cyber-Physical Systems

Wooyeob Lee*, Sungmoon Chung*, Moonwon Choi*, Sungryung Cho*, Inwhee Joe*,
Jeman Park**, Soohyung Lee**, Wontae Kim**

* *Department of Electronics and Computer Engineering, Hanyang University, Korea*

** *ETRI (Electronics and Telecommunications Research Institute), Korea*

{matias12, dear1115, c0322h, kyoug, iwjoe}@hanyang.ac.kr, {jeman, soohyung, wtkim}@etri.re.kr

Abstract— In this paper, we propose the architecture of the Data Distribution Service Gateway (DDS GW) to interconnect different DDS domains for large-scale Cyber-Physical Systems (CPS). We suggest the DDS GW service which runs on the DDS Middleware. It consists of four major components: Interface Module, Topic Manager, Routing Manager and Network Module. We also suggest a basic algorithm for resolving the bottleneck problem caused by the exchanges of EDP messages.

Keyword— Cyber-Physical System, CPS Middleware, Inter-Domain, DDS Gateway



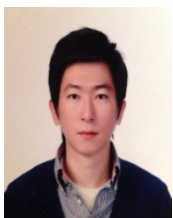
Woo-Yeob Lee received his B.S. and M.E. degree in Computer Science & Engineering from Hanyang University, Seoul, Korea in 2009. Currently he has done his PhD in the year 2009 from Hanyang University, His current research interests include Cyber Physical System, Cloud Computing, Cognitive Radio, D2D and Beyond 5G.



Sungmoon Chung did his B.S. in Division of Computer Science & Engineering and MS in Department of Electronics & Computer Engineering from Hanyang University, HengDangDong, Seoul. Currently he has done his PhD in the year 2009 from Hanyang University, Haengdang-dong, Seoul from the Department of electronics computer engineering. His research interest includes computer networking such as wireless sensor networks, 4G/5G cellular networks and CPS(Cyber Physical System).



Moonwon Choi received his M.S. degrees in Department of Computer Engineering from Hanyang University, HengDangDong, Seoul, Korea. Since 2011, he has done his Ph.D from Hanyang University, His current research interests include wireless sensor/ad hoc networks, convergence, A.I and Cyber Physical System.



Sungryung Cho received his B.S. degrees in department of Electrical engineering & Computer science from Kookmin University, Seoul, Korea in 2012. Since 2013, he has done his M.S. degree in Computer & Software from Hanyang University, Seoul, Korea. His current research interests include wireless sensor network, and CPS(Cyber Physical System).



Inwhae Joe received his B.S. and M.S. degrees in Electronics Engineering from Hanyang University, Seoul, Korea, and his Ph.D. degree in Electrical and Computer Engineering from Georgia Institute of Technology, Atlanta, GA in 1998. Since 2002, he has been a faculty member in the Division of Computer Science & Engineering at Hanyang University, Seoul, Korea. His current research interests include mobile internet, cellular system and PCS, wireless ATM, mobile ad-hoc networks, multimedia networking, performance evaluation..



Jeman Park received his B.S. and M.S. degrees in Electronics Engineering from Hanyang University, Seoul, Korea. Since 2012, he has been a faculty member of CPS Research Team at ETRI, Daejeon, Korea. His current research interests include Future internet, wireless sensor/ad hoc networks, 3G/4G cellular systems and Cyber Physical System.



SooHyung Lee received his Ph.D. in Computer Engineering from ChungNam National University in 2012 and BS, MS degrees from the department of Electronic Engineering, Hanyang University, Korea in 1991 and 1993 respectively. In August 1993, he joined the network design laboratory of DACOM Corporation. Since October 2000, he has been a Principal Member of Engineering Staff, CPS research team, Electronics and Telecommunications Research Institute (ETRI), Korea. His research interests include IT converging system, distributed communication, network security.



Won-Tae Kim received his BE, ME, and PhD degrees in Electronic Engineering from Hanyang University, Seoul, Korea in 1994, 1996, and 2000, respectively. He was CTO of Rostic Technologies, a venture company developing advanced mobile technologies during 2001–2005. In March 2005 he joined Embedded Software Development Division at ETRI. His major interests are: advanced mobile networks, mobile middleware and CPS-based computing.