Foreword

The Internet is supposedly stateless, and yet there is state everywhere you look. As the Internet grew up, more and more functionality has accreted, almost always for good reasons, in many layers, but nowhere more insidiously than in the simplest and most crucial of layers of the system architecture: The Internet Datagram Protocol layer (IP). Originally, the only state in routers (in-network devices) concerning IP, was route state concerned with delivering packets from source to destination over any available path. Such state was the business of specialised decentralised route computations, and hence only involved routers and not end-systems at all.

Initial attempts to add state to the network addressed support for quality of service above and beyond the IP Best Effort model (or rather, lack of model). Such state would reflect end system application, users and session needs for control of delay, and potential provision of minimum capacity guarantees. Hence the lifetime of such state would mirror the lifetime of application sessions and users' needs, and hence might need explicit protocols to configure and remove such state. One such protocol was the Resource Reservation Protocol (RSVP). Later, it became apparent that functionality had crept in to the network via the introduction of IP layer state for filtering (firewalls) and even IP layer protocol stateful packet modification (Network Address Translators). Over the last two decades, more and more cases for legitimate stateful tampering with the original simple stateless IP forwarding paradigm have emerged.

This book brings together a number of the cases for signaling state (setup, teardown, management) under one framework, the Cross-Application Signaling Protocol (CASP), pursued in the standards community through the auspices of the IETF's Next Steps in Signaling (NSIS) Working Group. The cross-application nature of the CASP design reflects the multiple purposes to which it applies, as outlined above.

There is a lot to the design of a signaling protocol than the protocol itself. Signaling is the business of communication that involves both end-systems and routers, and hence has different transport protocol requirements than end-to-end, or router-to-router applications. Hence CASP must speak to all systems and operate over a sufficiently Generic Signaling Transport Protocol. Furthermore, since the work on earlier signaling protocols such as RSVP were devised, most new end systems

of the Internet, (and some of the routers) have been mobile devices, thus we must take account of mobility in transport, and more crucially, in state management in general.

Finally, state management and signaling has seen massive upturn in interest in the advent of OpenFlow signaling and so-called Software Defined Networking. While this has a somewhat more limited application than CASP, the work in NSIS and on CASP is a clear precursor to this new addition to the Internet, which is now, as a result, more consistently and cleanly architected for stateful communication.

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