Julius-Maximilians-
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Exploring the Transmission Behaviour of Overwatch: The Source of Lag

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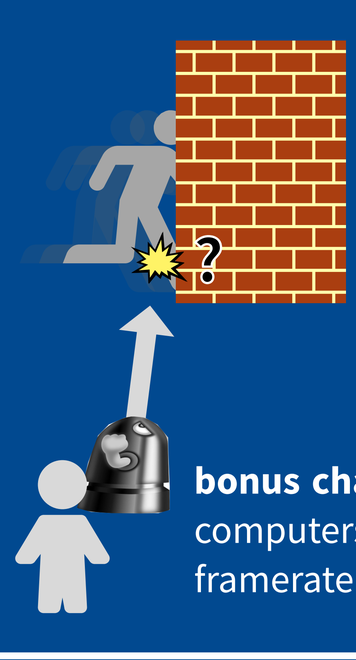
Lag in Competitive Video Games

Lag occurs at every component of gaming...

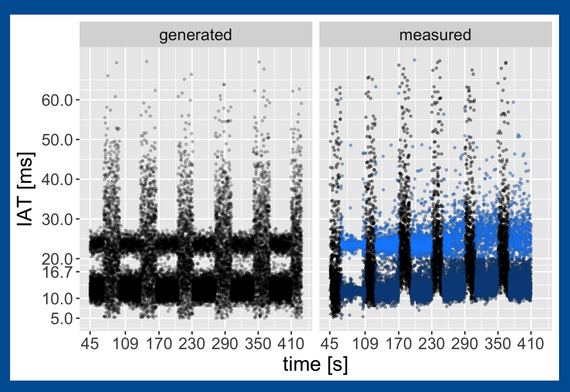


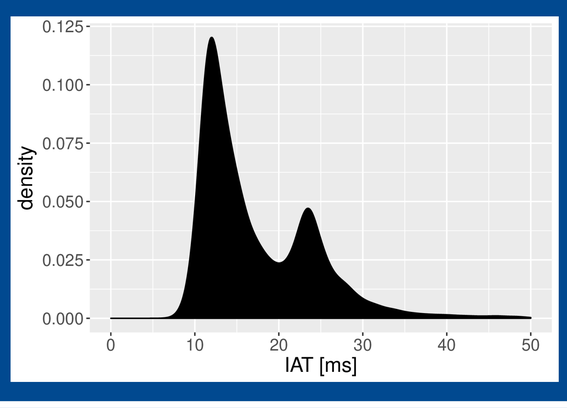
...and leads to
- **Desynchronised** behavior of clients
- Players getting hit even if they are seemingly behind an obstacle (and vice versa)
- Diminished **player experience**

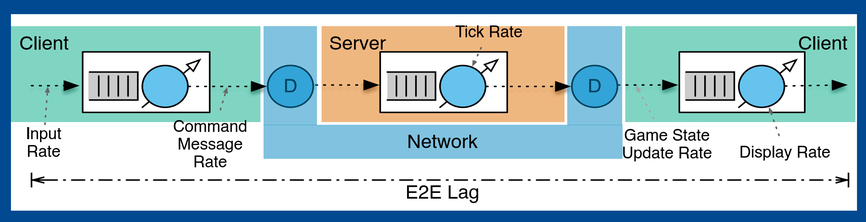
bonus challenge: resource-constrained client computers that struggle to maintain a stable framerate

Lag Models

Client to Server Communication

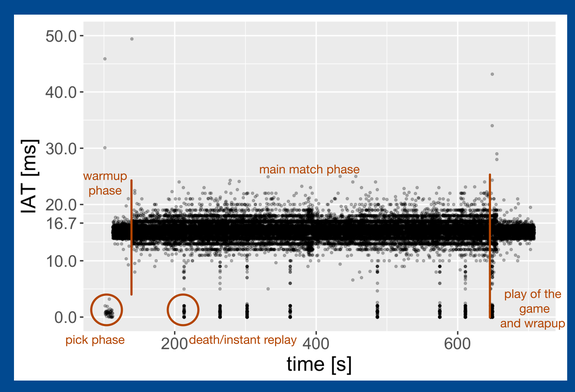


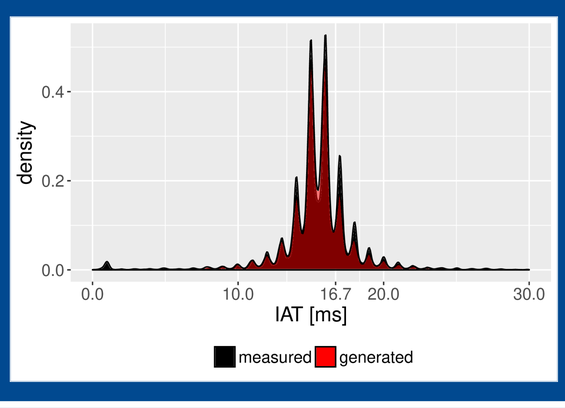




- Can describe all components leading to lag
- But modern games and engines offer **too many variables**
- Games are black boxes, public information not necessarily correct
- In-depth analysis of individual games and per-game parametrisation required
- Conducted investigation for **Overwatch**

Server to Client Communication

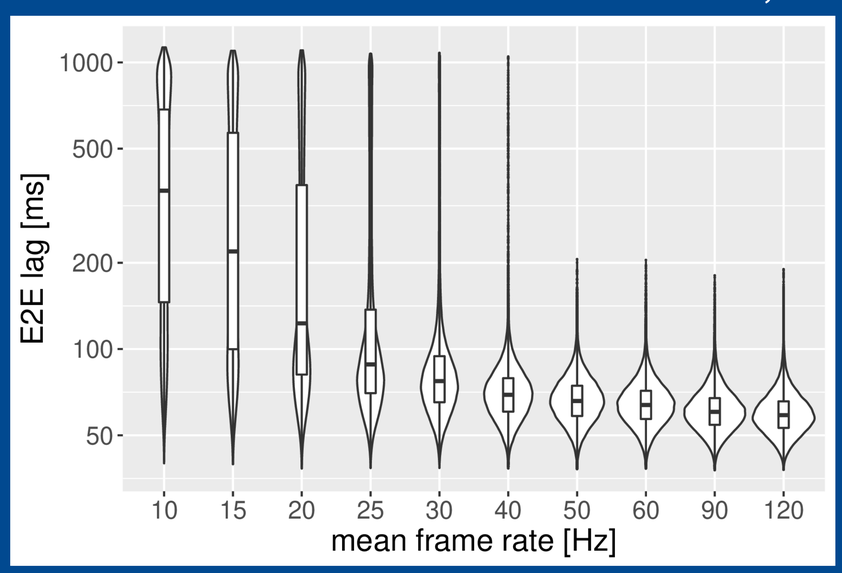




Adjusted Lag Simulation

Overwatch Modelling

- **Command Messages:** fit with two gamma distributed phases and an additional normal component
- **Update messages:** fit with a sine-modulated Cauchy distribution
- **User input:** Exponential distribution derived from recorded input
- **Network:** constant RTT (34ms) reflecting today's regional game hosting
- **Framerate:** Mean as a parameter with narrow normal distribution emulating resource-constrained computers



The Results

- Overwatch's server's tick rate may be advertised as 60Hz, but communication does not entirely reflect it
- Role of network for lag rather small
- **50 Hz** and up required to achieve reasonably low, stable lag (or 60 Hz, considering even frames and no screen tearing)
- Does not consider **lag compensation** mechanics that can conceal lag and predict the outcome
- Future work in directly monitoring **game engine** behavior

Find the paper, evaluation and simulation at https://github.com/fmetzger/overwatch-lag-model

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