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CENTRE FOR ADVANCED INTERNET ARCHITECTURES

A Synthetic Model for Quake Three Traffic

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Outline

- Why analyse game traffic in general and Quake 3 traffic in particular?
- How did we go about analysing Quake 3?
- What does Quake 3 traffic look like?
- How can we simulate it?
- Where do we plan to take the research?

Why investigate traffic characteristics of Quake 3?

- Of immediate benefit in design of networks
  - What traffic load does a Q3 server place on an ISP's network?
- Of longer term interest in general area of games traffic
  - Well designed game protocols should have common characteristics
    - Rate dependent on interactions with other players
  - Can we characterise the traffic for a 'well designed' game?

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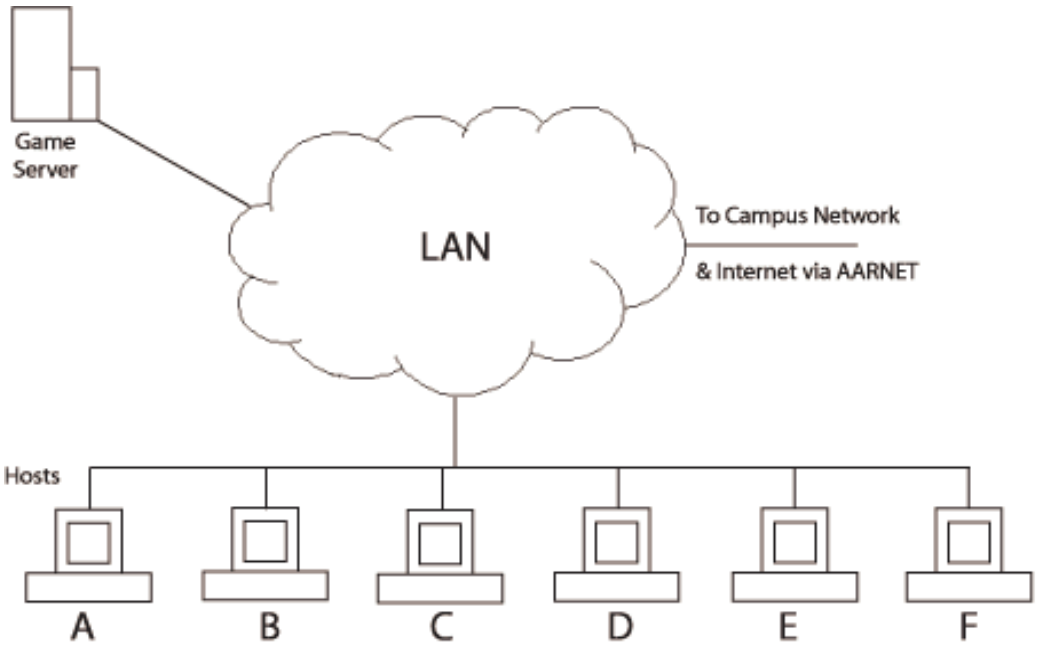
Experiment Layout



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Experiment Procedure

- Captured several months of game traffic played over our university LAN
  - Maximum of one hop from the game server
  - Players numbered between 2 and 8
  - Used a number of different cycles and maps
- Statistics analysed using SPSS
  - Mainly interested in distributions

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What does Quake 3 traffic look like?

- Quake 3 is a first-person-shooter game
  - Players explore a virtual world, meet other players and shoot them
  - Traffic generated by interactions with other players and interactions with objects in the world
- Need to look at four different groups of statistics
  - Packet rates and packet sizes
    - Packets from the client to the server
    - Packets from the server to the client

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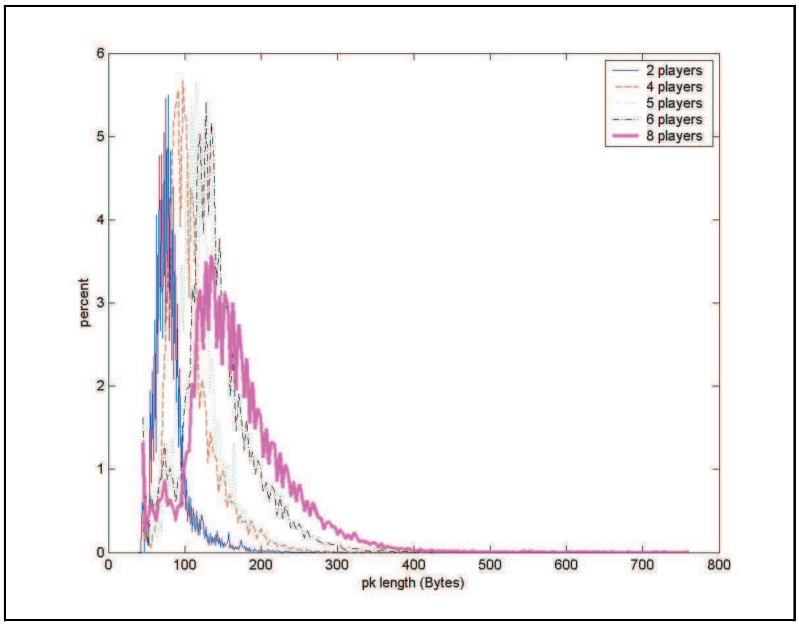
Packets from the server to the client – Packet Lengths

- Dependent on the number of players
  - Base mean size + fixed increment for each additional player
- Used a lognormal distribution to model it



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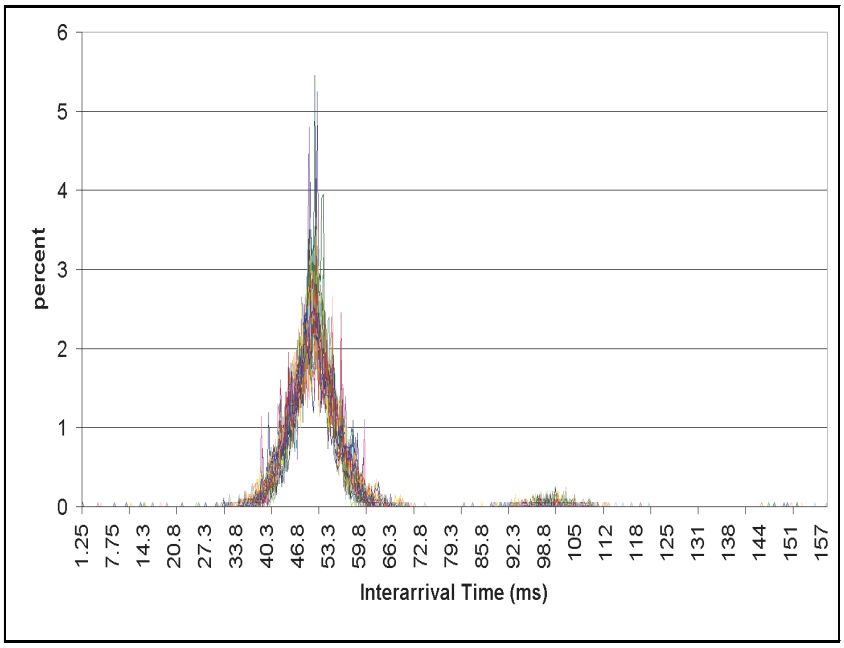
Packets from the server to the client – Packet Rate

- Good match to a Gamma distribution
- Actually modelled with an impulse at 50 ms



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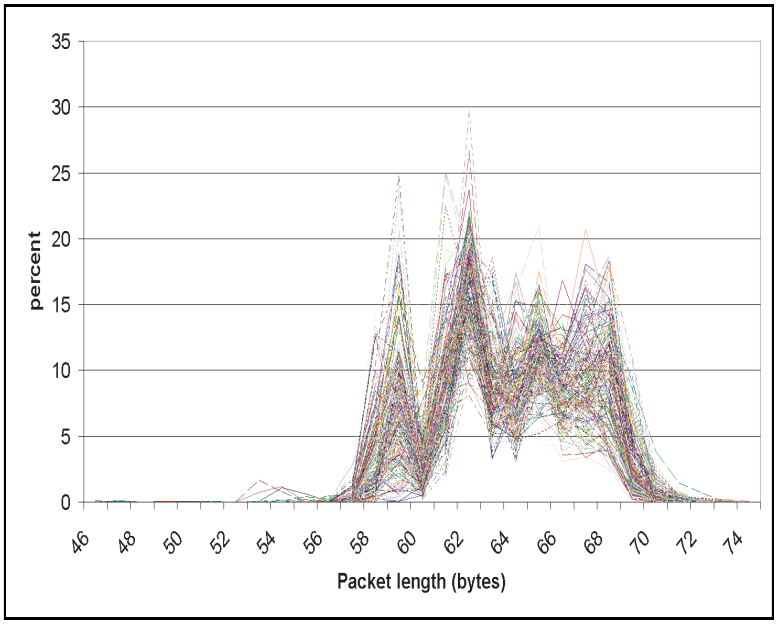
Packets from the client to the server – Packet Lengths

- Did not change regardless of map
- Modelled with a normal distribution



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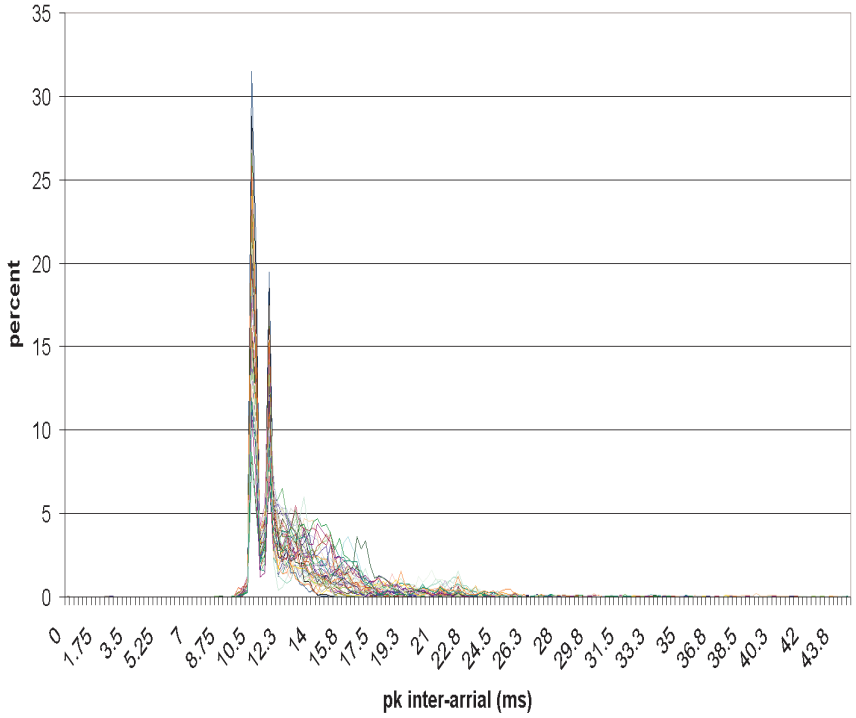
Packets from the client to the server – Packet Rate

- Some dependence on graphics card
- Traffic modelled with a dominant impulse and an exponential



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How can we simulate it?

- Can adequately model traffic in both directions with well known distributions
- Simple ns2 code using
  - normal
  - lognormal
  - exponential
  - impulse

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Where do we plan to take the research?

- How good is the model?
  - Many simplifying assumptions
  - When does the model fail?
- What traffic do other games generate?
  - Halo, Halflife
- What traffic characteristics do games share?
  - Can we construct general models for user behaviour and interactions?

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Conclusion

- Developed analytical and synthetic models for of game traffic network design
- This work is part of the longer term goal of understanding fundamentals of game traffic