

From packet to info-oriented networks

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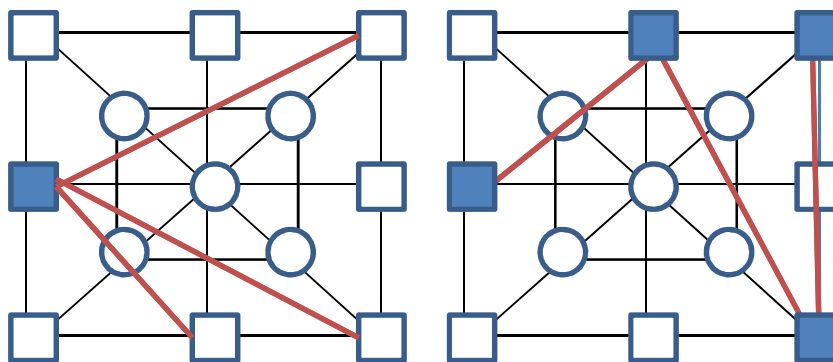
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Legacy models

	Sarnoff	Metcalfe (Ethernet) – Baran (Internet)
Spatial distribution of information	Centralized (in-net or periphery): $u = cte$	Distributed (periphery): $u = u(x)$
Pattern	Star, hub & spoke	Mesh
Scale (value)	n	n^2
Example	CDN, DC, etc	Micro, Web, etc.

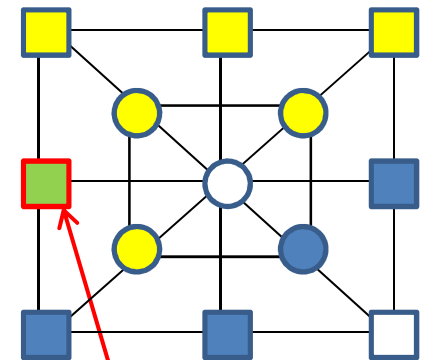
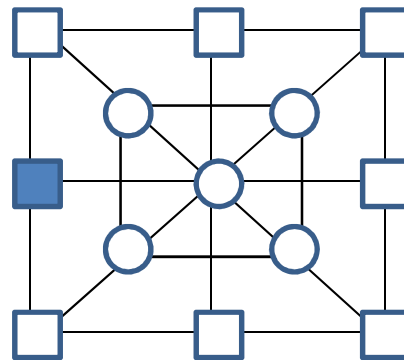


Models share commonality

- Specialization: network node  vs. terminal 
- Network nodes know how to reach "destinations" at localization/name resolution time (TCP/IP)

Mainstream approach

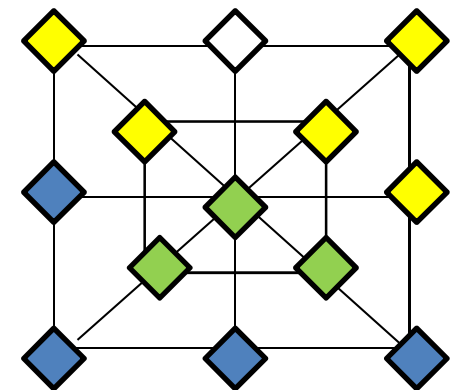
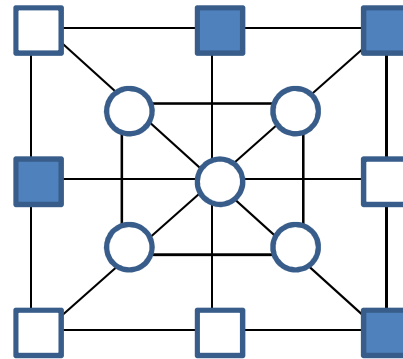
	Sarnoff	Metcalfe (Ethernet) – Baran (Internet)	Information/object communities
Spatial distribution of information u	Centralized: $u = cte$	Distributed:	Centralized
Pattern	Star, hub & spoke, etc.	Classical TCP/IP model inapplicable	Star, hub & spoke, etc.
Scale (value)	n	n^2	$\rightarrow 2^n$
Example	CDN, DC, etc	Micro, Web, etc.	



Collect and relate information from different domains/spaces ● ●

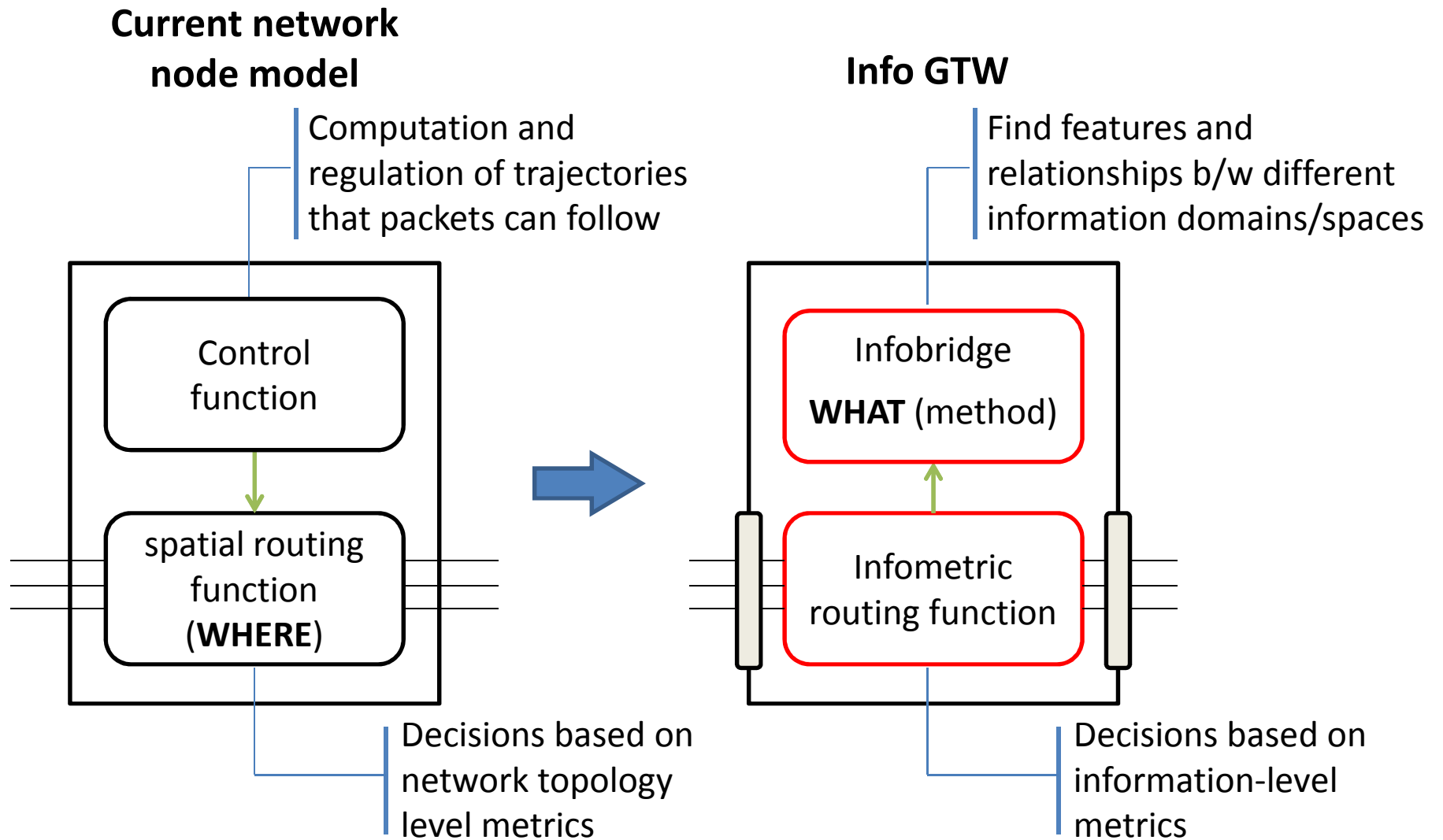
Our model

	Sarnoff	Metcalfe (Ethernet) – Baran (Internet)	Information/object communities
Spatial distribution of information	Centralized: $u = cte$	Distributed: $u = u(x)$	Dynamic: $u = u(x,t)$
Pattern	Star, hub & spoke	Mesh	Convective (diffusion- advection)
Scale (value)	n	n^2	2^n (BBS)
Example	CDN, Cloud, etc	Micro, web, mail, ...	



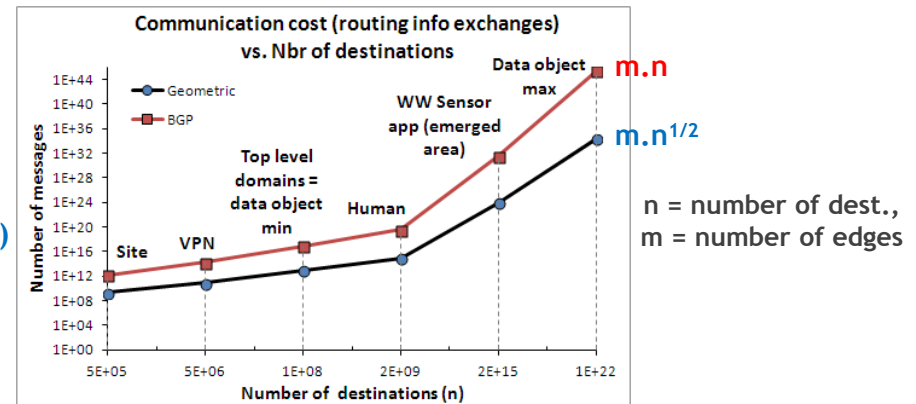
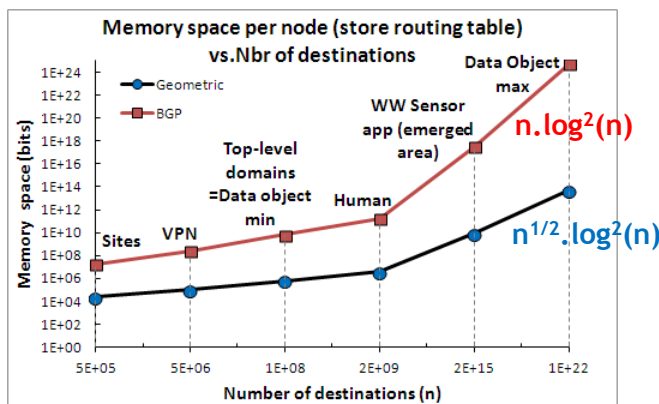
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Project objectives

- Explore first order principles and network models to “design” info GTW
- **Main challenges**
 1. Universality and genericity → target replacement or “overlay”
 2. Remove dependence on dest. locator-based only exchange
⇒ Rethink localization function (e.g. information grouping)
 3. Dynamics in spatial distribution of information without specialization (host vs. network nodes)
→ Principle of performing routing decisions before "localization" becomes inefficient if ever achievable (#routes ~ #data objects)



⇒ Polylog header size and Dynamic learning of information-level metrics

Project structure and expertise

Step 1:

- **Skills:** TCS, comp./alg. learning theory, comp. intelligence (EA)
- **Task:** procedures, algorithms and proofs
- **Outcome:** theoretic validation

2-3 partners

Step 2:

- **Skills:** stat. inference, data-driven/unsupervised ML, optimization (combinatorial, continuous, robust)
- **Task:** programs and numeric evaluation
- **Outcome:** alg. design choices and performance evaluation

2-3 partners

Step 3:

- **Skills:** software development (HL), experimental evaluation
- **Task:** develop abstract protocol model/components
- **Outcome:** demonstrator

1+1 partner