SNA Unit 3

SNA Email

The Lifeblood of Modern Communication

3.1.1 Introduction & Importance

- **Ubiquity:** Email is the most common internet activity (90% of users). Unlike many social media tools, it spans all demographic groups, including older adults.
- **The "Mirror" Effect:** Analyzing personal email is like looking in a mirror; it reveals actual social hygiene and work relationships, overcoming memory biases.
- **Organizational Value:** Used to identify internal influencers, "silos" (disconnected groups), and bridge-spanners. It is based on **actual behavior** rather than often-biased self-reports.

3.1.2 Technical Characteristics of Email

- **History:** Older than the internet. Ray Tomlinson introduced the **"@"** symbol in 1971 to separate user and host.
- **Key Features:**
  - **Flexible Form:** Supports plain text, rich newsletters, and attachments.
  - **Asynchronous:** No real-time interruption; encourages thoughtful responses.
  - **Broadcast:** Allows ad-hoc grouping and large-scale communication (Listservs).
  - **Push Technology:** Senders determine what arrives in the receiver's inbox.
  - **Threaded Conversation:** Grouped collections of messages and replies mimic natural turn-taking.

3.1.3 Email Networks

- **Vertices (Nodes):** Represent unique email addresses or people.
- **Edges (Ties):** Directed lines representing messages sent from one person to another.
- **Weight:** Typically based on the total volume of messages exchanged.
- **Aggregation:** Networks can be "rolled up" to show connections between entire departments or organizational units rather than individuals.

3.1.4 Analytical Questions by Category

Category	Key Focus Questions
Personal	Who are my boundary spanners? Which projects have I neglected? What are my natural subgroups?
Organizational	Who are the influencers/experts? How does the "real" communication flow differ from the formal org-chart?
Community	Who are the leaders in a public forum? Is the community healthy and growing?

3.1.5 - 3.1.6 Data Preparation & Cleaning

- **Protocols:** SMTP (sending), POP/IMAP (retrieving).
- **Entity Resolution:** The process of matching multiple email addresses (aliases) to a single person. This is a major challenge in email analysis.
- **Data Cleaning in NodeXL:**
  1. **Remove Aliases:** Using Find/Replace or a Lookup table to ensure "john.doe@company.com" and "jdoe@gmail.com" are mapped to the same vertex.
  2. **Merge Duplicate Edges:** Rolling up multiple individual messages into a single weighted edge.
  3. **Remove Self-Loops:** Deleting instances where people email themselves (unless they represent "reminders" relevant to the study).

3.1.7 Case Study: Personal Email Analysis

- **Overview Visualization:** A snapshot of a month's activity. To reduce clutter, analysts often filter out infrequent ties (e.g., edges with a weight < 5).
- **Expertise Networks:** Created by filtering the corpus for specific keywords (e.g., "NodeXL" or "Research"). This reveals who talks most about a specific topic.
- **Common Patterns:** "Fan" structures (hubs sending many messages but receiving few) and densely connected cliques (team collaborations).

3.1.8 Case Study: Organizational "Living Org-Charts"

- **Normalizing Data:** In large companies like "TechABC," absolute message counts are misleading. Analysts use **Messages per FTE (Full-Time Equivalent)** to compare small and large units fairly.
- **Bridge Spanners:** Small units that link large, separate divisions are critical; they are often vulnerable to employee turnover.

- **Research Division Example:** Analysis showed that while many research units exist, they are often disconnected from one another, suggesting a lack of interdisciplinary collaboration.

3.1.9 Case Study: Historical/Legal (Enron)

- **The Dataset:** ~500,000 emails made public after the Enron investigation.
- **Content Networks:** Using keywords like "FERC" (Federal Energy Regulatory Commission) to find relevant clusters.
- **Identifying Key Players:** High **In-Degree** (receiving many messages) can signal a central "go-to" person or, in legal contexts, a mastermind.
- **Finding Violators:** In the Enron data, Tim Belden (a key witness/conspirator) was identified by his unique position in the "FERC" communication network.

3.1.10 - 3.1.11 Practitioner & Researcher Agenda

- **Ethics:** Monitoring email is legally permissible for most companies but requires transparency to avoid "Big Brother" perceptions.
- **Future Research:** * **Forensic Tools:** Improving how we find documents in massive archives.
    - **Temporal Changes:** Detecting sharp increases/decreases in communication that signal major events (rumors, reorganizations, or crises).
    - **Geo-location:** Tying email to physical office positions to understand social flow.

Thread Networks

Mapping Message Boards and Email Lists

3.2.1 Introduction

- **Core Function:** Threaded conversations are the primary communication channel for virtual communities (email lists, web boards, Usenet).
- **Versatility:** They serve diverse groups—from medical support to corporate workgroups.
- **Network Suitability:** The "post-and-reply" structure is ideal for network analysis because every reply creates a directed link between individuals.
- **Modern Integration:** Threaded conversations are now embedded in platforms like Facebook, YouTube, and Flickr.

3.2.2 Definition and Key Properties

Threaded conversation is a design theme using a post-reply-reply structure. Key characteristics include:

- **Topics:** Hierarchically organized, persistent spaces (e.g., "Social Media," "NodeXL").
- **Threads:** A top-level message plus the entire tree of responses.
- **Single Authored:** Each message is created by one user.
- **Permanence:** Posts usually cannot be edited or retracted (though newer systems like Google Wave/Google Docs changed this).
- **Homogeneous View:** All users see the same chronological or reverse-chronological order.
- **Push vs. Pull:** Email lists "push" content to users; forums require users to "pull" (visit the site).

3.2.3 Analytical Questions

1. **Individuals:** Who are the experts, answer-people, and discussion-starters? Who can replace an outgoing administrator?
2. **Groups:** Who is the "core" vs. "periphery"? What subgroups exist?
3. **Temporal:** How do participation patterns change over time? How does a member transition from "newbie" to "expert"?
4. **Structural:** What roles reoccur? Is the community sustainable?

3.2.4 Threaded Conversation Networks

There are three main ways to map these interactions:

1. **Reply Network:**
   - **Mechanism:** A directed link from the person replying to the specific person they are answering.
   - **Utility:** Captures the true conversational flow.
2. **Top-Level Reply Network:**
   - **Mechanism:** Connects all repliers directly to the person who *started* the thread.
   - **Utility:** Emphasizes thread-starters; useful for Q&A communities where most answers are directed at the original asker.
3. **Bimodal (Affiliation) Network:**
   - **Mechanism:** Connects users (Mode 1) to specific threads or forums (Mode 2).
   - **Utility:** Identifies "boundary spanners" who participate in multiple distinct topics.

3.2.5 Case Study: Technical Support (CSS-D)

Technical support lists like CSS-D (Cascading Style Sheets) are often analyzed to find high-value contributors.

Identifying Social Roles

Social Network Analysis (SNA) identifies roles better than simple post counts:

- **Answer People:** * High **Out-Degree** (they reply to many people).
  - Low **Clustering Coefficient** (the people they help usually don't know each other).
  - They act as "hubs" for information.
- **Question People:**
  - Low Degree.
  - High **Average Degree of Neighbors** (they are connected to experts/answer-people).
- **Discussion Starters:**
  - High **In-Degree** (they get many replies).
  - High **Clustering Coefficient** (the people replying to them often talk to each other).

The "Answer Person" Score

Analysts create composite metrics to find these users automatically:

- **Formula Example:** (Percent Out-Degree) × (Clustering Coefficient Inverse).
- **Strategic Value:** Identifying these users helps managers know who to thank and protect from burnout.

3.2.6 Case Study: Finding a New Administrator (ABC-D)

When an administrator leaves, SNA can find a replacement based on their position in the network:

- **Key Metric: Betweenness Centrality**. Candidates with high betweenness already act as bridges between different clusters of the community.
- **The "What-If" Analysis:** By manually removing the current administrator from the graph (using "Skip") and recalculating metrics, managers can see whose influence increases and who might naturally step into the role.

3.2.7 Case Study: Ravelry Groups

Ravelry (a yarn/knitting community) illustrates the use of **Bimodal Networks**:

- **Connection:** Links users to the forums they post in.
- **Insights:** Shows that location-based groups (e.g., "Chicago Fiber Arts") have different patterns than project-based groups.
- **Boundary Spanners:** Users connected to multiple blue text boxes (forums) are identified as the connectors of the wider community.

3.2.8 - 3.2.9 Practitioner and Researcher Summary

- **Practitioners:** SNA provides a "forest view" of massive conversation archives, revealing social structures that participation statistics alone miss.
- **Researchers:** Future study is needed on the "right mix" of roles (how many answer-people are needed to sustain a community?) and the impact of combining threaded conversations with other tools like wikis.

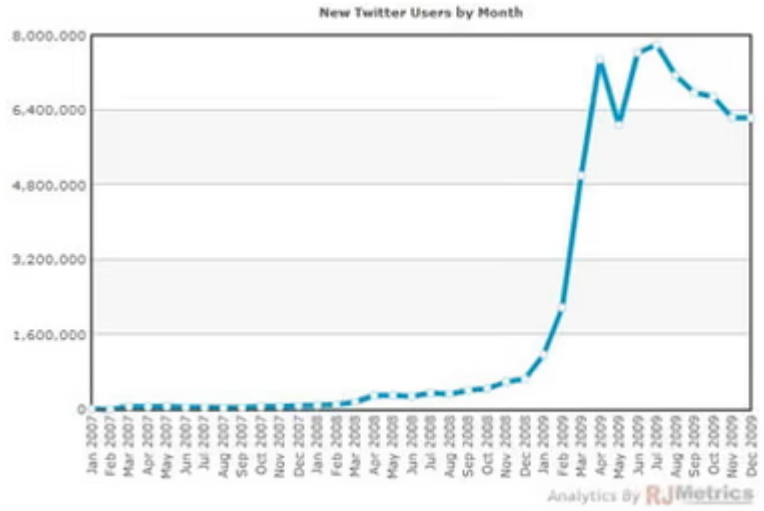
Study Tip: For the exam, be able to differentiate between **Answer People** (High Out-Degree/Low Clustering) and **Discussion Starters** (High In-Degree/High Clustering). This is a frequent technical question in SNA.

SNA Twitter

Conversation, Entertainment, and Information

3.3.1 Introduction: The Rise of the Microblog

- **Simplicity as Strategy:** Twitter's success stems from its "brass-tacks" construction: a stream of short messages and an empty box.
- **Cultural Impact:** Used for political campaigns, fan engagement, and real-time coordination during natural disasters (hurricanes, wildfires) or political turmoil (Iran 2009).
- **Growth Milestones:** * **SXSW 2007:** Initial "tech-savvy" buzz.
  - **The "Oprah" Effect (2009):** Mainstream adoption driven by celebrities like Shaquille O'Neal, Ashton Kutcher, and Oprah Winfrey.
- **Ecosystem:** Beyond the web interface, third-party clients like **TweetDeck** and **Twhirl** allow for specialized views (columns, search queries).

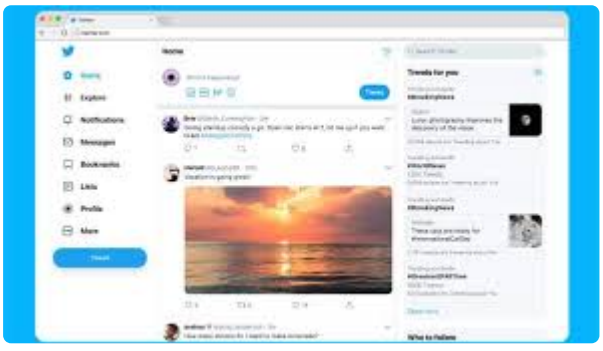


3.3.2 The Nuts and Bolts

Twitter is a **conversational microblog** where users post "tweets" limited to **140 characters** (originally for SMS compatibility).

Key Terminology

- **Followers:** People who subscribe to your messages.
- **Friends:** People whom *you* follow.
- **@replies & @mentions:**
  - **@reply:** A tweet starting with a username (e.g., `@redlog`). A "marker of addressivity" that keeps conversations coherent in a noisy environment.
  - **@mention:** Including a name within a tweet but not at the start.
  - **Symmetry:** While following is often asymmetric (celebrities have fans but don't follow back), the exchange of @replies creates a **symmetric connection**, indicating a stronger social tie.
- `#hashtags`: * Community-driven descriptive keywords.
  - Used for events (#chi2010), news (#mumbai), or games (#robotpickuplines).
- **Retweeting (RT):** * Rebroadcasting someone else's tweet with attribution.
  - Functions as **validation** (I like this) and **amplification** (I want my followers to see this).



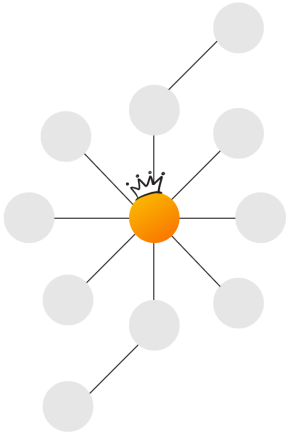
3.3.3 Networks in Twitter: Attention vs. Information

The "Friends/Followers" network is actually two distinct networks overlaying the same people:

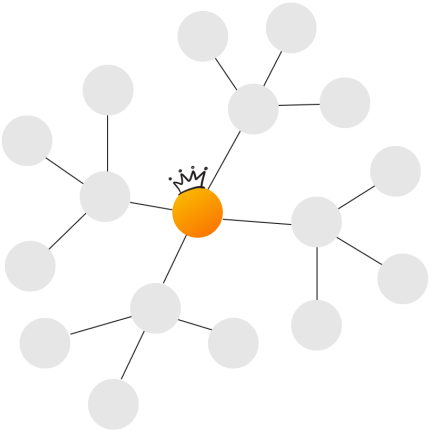
1. **Attention Network:** Follower ties show where attention flows (e.g., from a fan to a celebrity).
2. **Information Network:** The reverse direction; shows where information flows (from the tweeter to the followers).

Centrality Metrics in Twitter

- **Eigenvector Centrality (Importance):** Measures influence. You are important if you are followed by other "important" people (similar to Google's PageRank).
  - *Practical Use:* Identifying **spammers** who may have many followers, but whose followers are unimportant/fake.
- **Betweenness Centrality (Brokerage):** Measures access to **non-redundant information**.
  - *The "Bridge":* An actor who connects two otherwise unconnected clusters. High betweenness actors are "information brokers" who see diverse content first.



A node with a high degree centrality score



A node with a high eigenvector centrality score

3.3.4 Acquiring Data & Limitations

- **NodeXL Options:** "From Twitter User's Network" (Ego-centric) or "From Twitter Search Network" (Topic-centric).
- **Rate Limits:** Twitter restricts standard accounts to **150 requests per hour**. **Whitelisting** can increase this to 20,000/hour.

- **Speed:** Data collection is slow (10–30 seconds per user). Mapping a network of 1,000 users can take hours.

3.3.5 Discovery with NodeXL

3.3.5.1 The Ego Network

- **Ego:** The focal user. **Alters:** The user's friends and followers.
- **Strong Ties vs. Weak Ties:**
  - **Reciprocal Ties:** (You follow me, I follow you) usually indicate close friends or colleagues.
  - **Closed Triads:** If two of your friends know each other, it forms a "closed triad," suggesting a tight, cohesive community.
- **Cluster Detection:** Using NodeXL's "Find Clusters" can automatically separate your Twitter alters into real-world groups (e.g., "Family" vs. "Work Colleagues").

3.3.5.2 Trending Topics (Information Diffusion)

- **Diffusion Patterns:**
  - **Star Pattern:** One user's tweet is retweeted by many followers (highly influential "seed").
  - **Grid Pattern:** Users only mention a topic after seeing it from multiple sources (social influence/redundancy is key).
- **Case Study:** `#BlackFriday` **:**
  - Analysis reveals "seeds"—specialized accounts that may have few followers but are highly effective at getting their messages retweeted by larger, more active accounts.

3.3.6 Practitioner's Summary

- **Strategy is Key:** Whether for personal branding or business, you must identify the **network structure**.
- **Starlike networks** prioritize the center; **Cohesive networks** prioritize the group.
- Identify "seeds" (influential promoters) to maximize information spread for free.

3.3.7 Researcher's Agenda

- **Micro-level:** Studying individual features like retweets and @replies.
- **Macro-level:** Mapping memes, idea spread, and organizational connections across institutional boundaries.

> - **Challenge:** Obtaining and visualizing the "minute details" of human conversation as networks change over time.

Links:

SNA Unit 1

SNA Unit 2

SNA Unit 3

SNA Unit 4

SNA Unit 5

Communication Technologies

Conversational AI