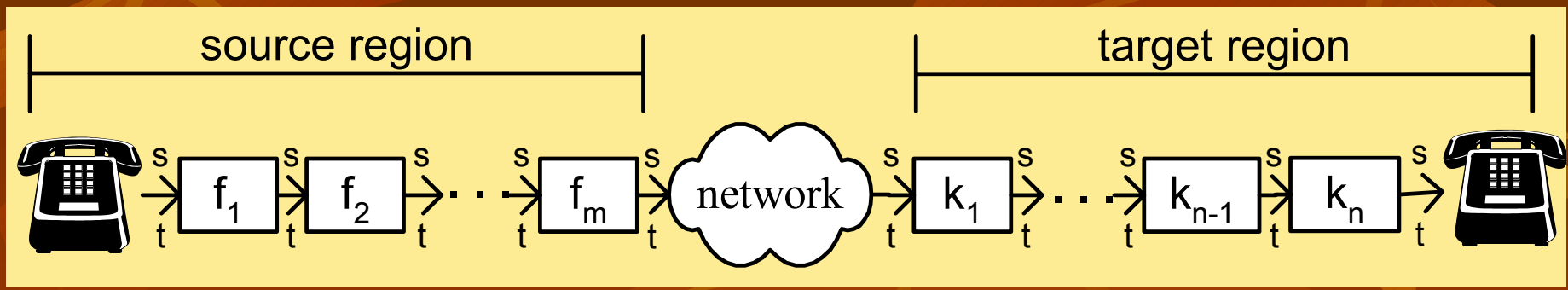
Categorizing and Prioritizing Telephony Features

Ann Zimmer and Joanne Atlee
University of Waterloo

pameade@cs.uwaterloo.ca

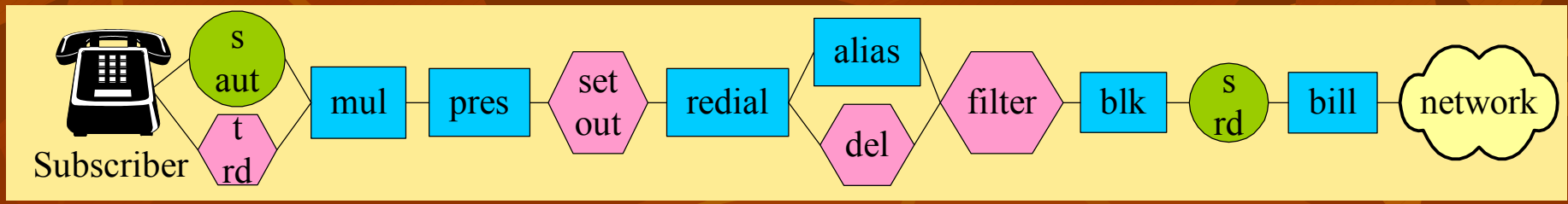
Problem

- Call is a serial composition of feature modules
- Problem – How to order features
  - Seems simple but there are a large number of features to consider
- Solution – Minimize the number of feature comparisons required to add a new feature to an existing system



Preliminary Results

- A partial ordering of feature categories
- Methodology for ordering features
  - Classification of features into categories based on their functionality
  - Order categories based on common principles of "ideal" feature ordering
  - Pair-wise comparison of features within the same category

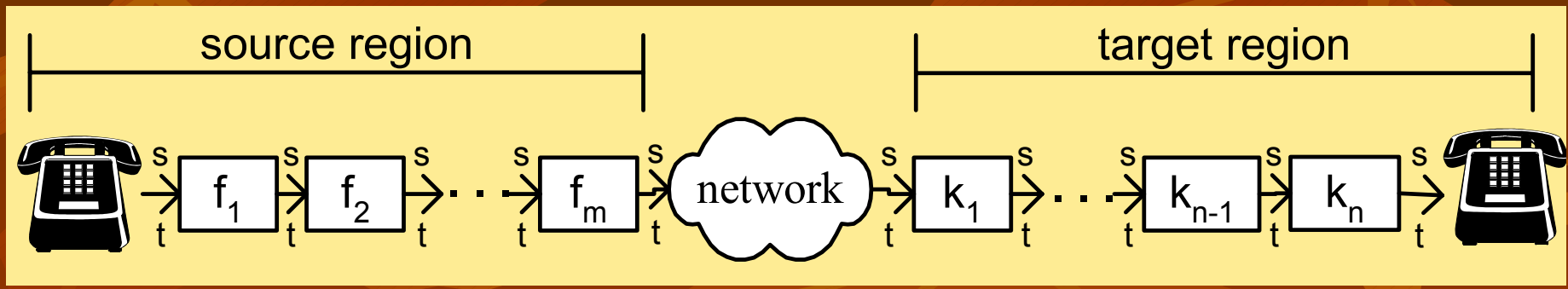


Overview

- Motivation
- Classification of Categories
- Principles for Ideal Feature Orderings
- Partial Order of Feature Categories
- Proof of Concept and Other Future Work

Terminology

- Source region: the caller's side of the call
- Target region: the callee's side of the call
- Address: the network identifier used to determine where a call should be directed and which features should be applied



Classification of Feature Categories

- Features categories determined by F*unctionality* – what is the main functionality preformed by these features when triggered.
  - Redirect call
  - present call
  - change call status
  - etc

Feature Categories

- Alias
- Billing
- Blocking
- Delegate
- Filter
- Multiplex
- Presentation
- Redial
- Set Outcome
- Source Authentication
- Source Redirect
- Target Redirect

Alias, Blocking, & Redial

- *Alias*: (Source and/or Target Region)
  - Allows the user to employ an alias to refer to another address
  - Example: Speed Dial, Personal Directory
- *Blocking*: (Source and Target Region)
  - Prevents blocked calls from being established
  - Example: Originating & Terminating Call Screening
- *Redial*: (Source and/or Target Region)
  - Place a call to a previously recorded address
  - Example: Return Call, Automatic CallBack

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Principles for Ideal Feature Orderings

- Principles represent desired attributes of telephony environment
  - Represents system properties on desirable control flow and data availability
- Feature categories are ordered to optimize adherence to the principles

Constraint versus Criterion

- *Constraint*: A requirement that must be met to satisfy system properties
- *Criterion*: A property that the system will try to optimize
- Constraints *must* be satisfied to ensure the successful resolution of interactions
- The system is designed to *optimize* adherence the Criteria

Principles

Constraints

- Abortion
- Authorization
- Invoicing

Criteria

- Accessibility
- Concretization
- Logging
- Personalization
- Presentation

Abortion Principle (Constraint)

- *Abortion*:
  - Undesired calls should be aborted
  - Categories that define undesired calls (blocking, filter) must abort such calls
- Example:
  - Features that prevent calls that incur long distance charges
  - Features that block incoming or outgoing calls based on the network address

Authorization & Invoicing (Constraints)

- *Authorization*:
  - The end user's identity must be verified before any of his features can be accessed
- *Invoicing*:
  - Every call (or subcall) must be billed to some user

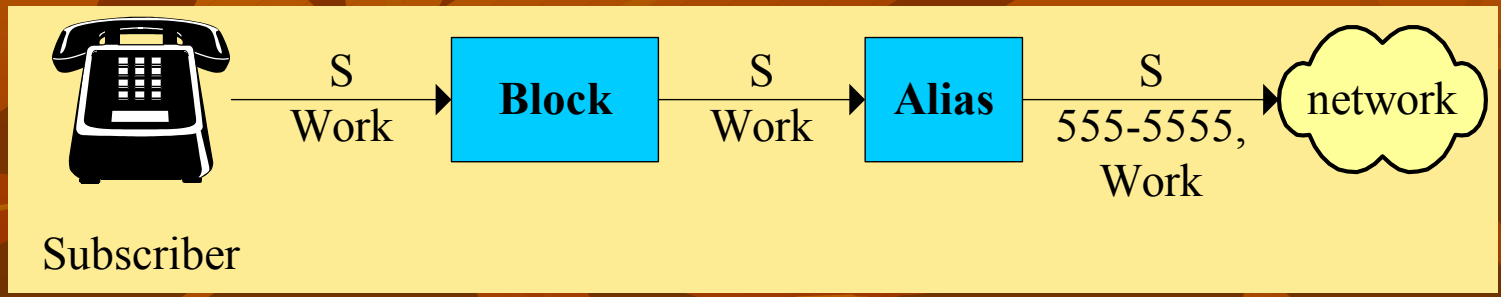
Concretization (Criterion)

- *Personalization*:
  - Aliasing information should be used when presenting information to the subscriber
- Example:
  - Presentation features should display alias information to the user when presenting a call – receiving the alias “Mom” is more informative than receiving a concrete address, which could be one of many addresses associated with “Mom”

Logging & Presentation (Criteria)

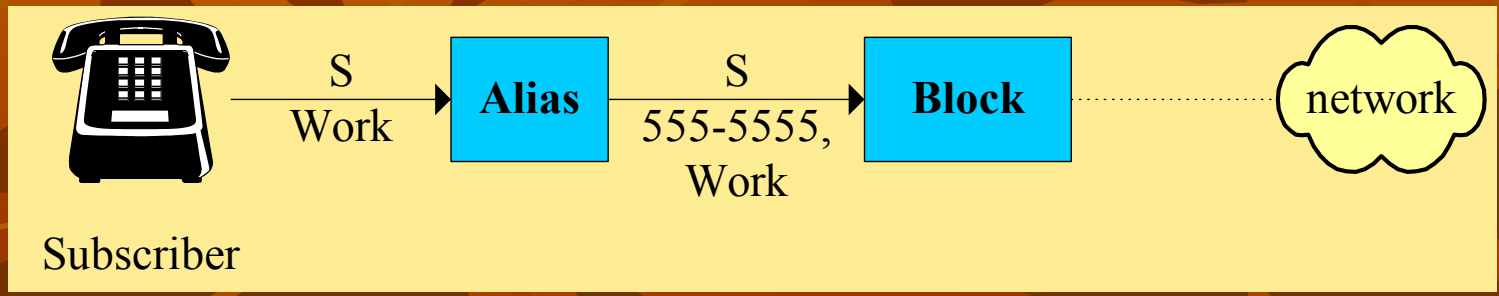
- *Logging*:
  - Relevant call information about all successful and unsuccessful calls should be recorded
- *Presentation*:
  - Only information about successful calls should be presented to the subscriber

Example: Abortion Principle



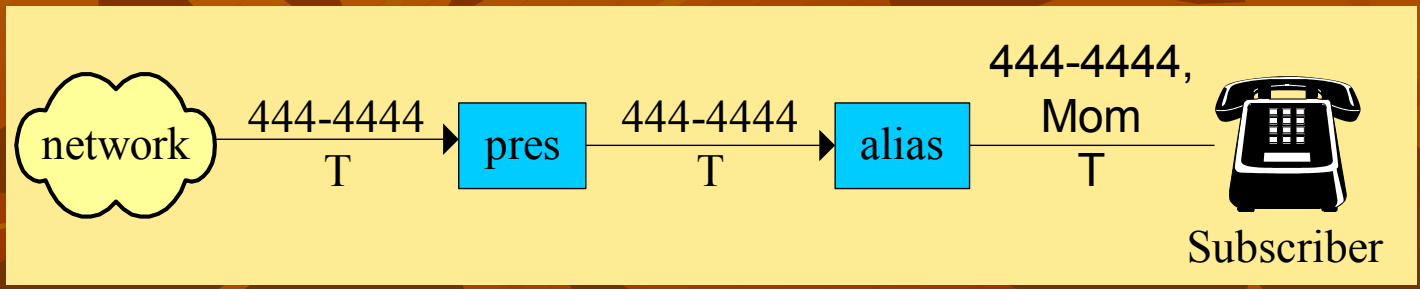
- The blocking feature does not find the alias, “Work”, on its blocking list and allows the call to progress
- The alias feature translates a dialed alias, “Work” into a network address, 555-5555
- Violation: Abortion principle – a blocked address has been connected

Example: Abortion Principle



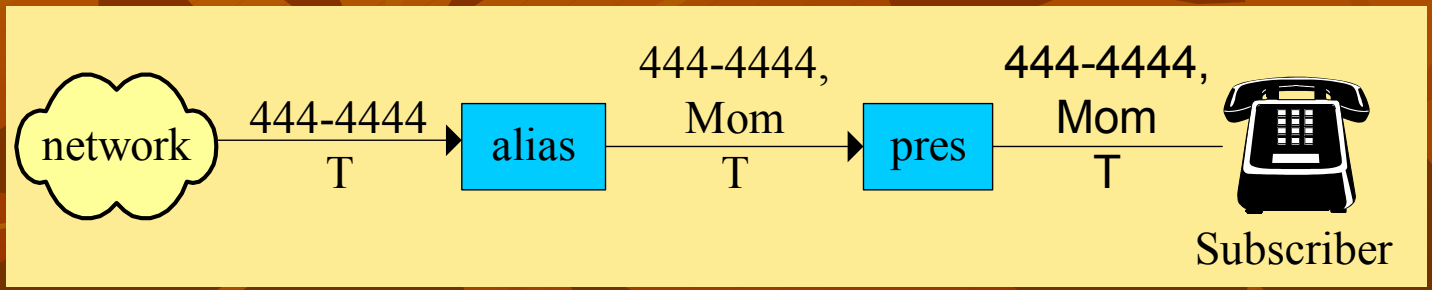
- The alias feature translates a dialed alias, “Work” into a network address, 555-5555
- The blocking feature blocks the network address, 555-5555
- No Violation: Accept Order

Example: Personalization Principle



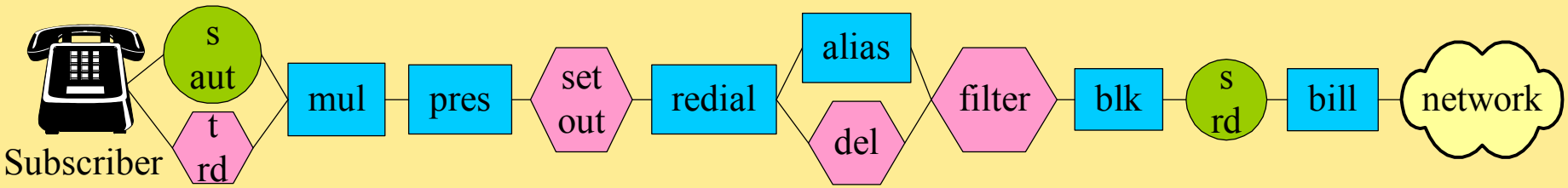
- Presentation sends a signal to display 444-4444 to the subscriber
- The alias feature translates the address, 444-4444, into an alias "Mom"
- Violation: Personalization principle – alias information has not been displayed

Example: Personalization Principle



- The alias feature translates the address, 444-4444, into an alias "Mom"
- Presentation sends a signal to display "Mom" to the subscriber
- No Violation: Accept Order

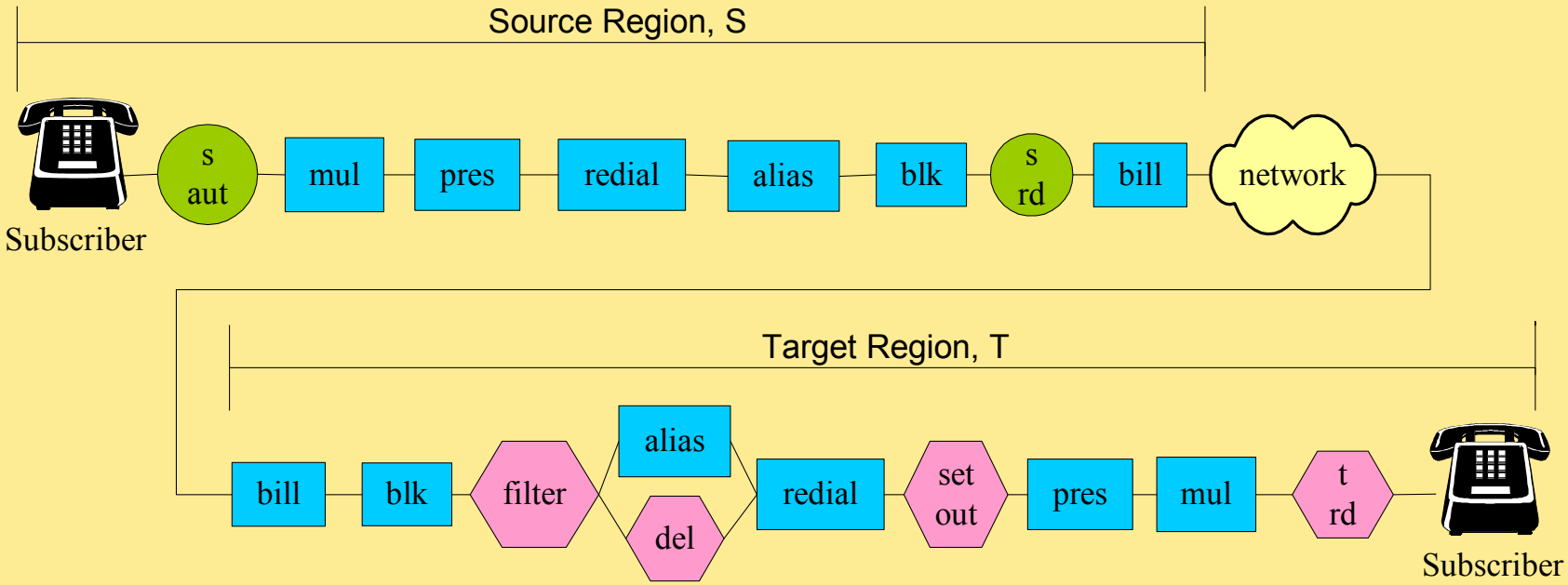
Partial Ordering



Shapes: circles: Source Features	hexagon: Target Features	rectangle: Source & Target
Legend: s aut: Source Authentication	pres: Presentation	blk: Blocking
t rd: Target Redirect	set out: Set Outcome	s rd: Source Redirect
mul: Multiplex	del: Delegate	bill: Billing

- Partial-Ordering satisfies all Constraint Principles
- Partial-Ordering satisfies most Criteria Principles, under common call scenarios

Sample Call



- Feature ordering is reversed in target region.

Methodology

- Methodology for ordering features
  - Classification of features into categories
  - Order categories based on principles of “ideal” feature ordering
  - Pair-wise comparison of features within the same category
- New features
  - Classify feature
  - Order feature within its category

Validation

- Analyzed over 300 features
- Extracted 35 distinct features
  - 132 inter-category comparisons
  - 55 intra-category comparisons
    - Largest category has 6 distinct features
  - Avoided 540 feature-pair comparisons
    - 595 feature pairs – 55 intra-category pairs

Proof of Concept

- Using Prolog to validate and generate partial-ordering
  - Encoding principles and main functionality of each feature category
  - Testing for violations of principles for different combinations of feature orderings
  - Eventually – output possible partial orders that do not violate the Constraint Principles
  - Determine location of new feature categories

Future Work

- Interesting categories not in paper
  - Device Interface
  - Dual features
  - Multiple Category Features
- Strategies for determining order within a category
- Continue work on proof of concept
- Expand concept to other feature-intensive domains

Questions?