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# OMOS: A Framework for Secure Communication in Mashup Applications

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December 2008

[Introduction](#)

[Mashups](#)

[Architecture](#)

[Security in  
client-side services](#)

[OMOS](#)

[Experiments](#)

▷ What is a **Mashup** application?

## ▷ What is a **Mashup** application?

- Seamlessly combine contents from multiple heterogeneous data sources.
- Overall goal: more integrated and convenient end-user experience.
- Becoming very popular - Web 2.0

[Introduction](#)

[Mashups](#)

[Architecture](#)

[Security in  
client-side services](#)

[OMOS](#)

[Experiments](#)

- ▷ What is a **Mashup** application?
- ▷ My favorite mashup website *Zillow!*

- Introduction
- Mashups**
- Architecture
- Security in client-side services
- OMOS
- Experiments



Find homes:

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Introduction

Mashups

Architecture

Security in client-side services

OMOS

Experiments



**199 Buckingham Way** Somerset NJ 08873  
2 beds, 2.5 baths, 1,336 sq ft

🏠 **Recently Sold: \$264,000**

My Estimate: [CREATE](#)

Monthly Payment: \$ **1,613** [EDIT](#) [ING DIRECT Mortgages with Low Rates](#)

💡 Need to refi? Get loan quotes, anonymously. [Zillow Mortgage Marketplace](#)

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**Street View** [ADD PHOTO](#)

▶ [See a larger Street View](#)

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**Home Info** [EDIT](#)

199 Buckingham Way, Somerset, NJ

<b>Owner Facts:</b>	<b>Nearby Schools: ?</b>
<ul style="list-style-type: none"><li>• Townhouse</li><li>• 2 beds</li><li>• 2.5 bath</li></ul>	District: <a href="#">Franklin Twp</a> Primary: <a href="#">Conerly Road</a> Middle: <a href="#">Sampson G. Smith ...</a> High: <a href="#">Franklin Twp High</a> <a href="#">See more Somerset schools</a>

Introduction

Mashups

Architecture  
Security in  
client-side services

OMOS

Experiments



[See more Somerset schools](#)

▸ [See all home info](#)

### Charts & Data

**ZESTIMATE®: \$266,000** [?](#)

Value Range: \$247,380 - \$281,960

30-day change: \$2,000

Zestimate updated: 11/26/2008

**Last sale and tax info**

**Sold 10/06/2008: \$264,000**

**2008 Property Tax: \$5,376**

1YR 5YR 18YR

Jan04 Jan06 Jan08

▸ [See all charts & data](#)

### Comparable Homes

**How this home stacks up**

This home \$ per sq ft: **\$199**

Comps avg \$ per sq ft: **\$150**

[How to use these comps](#)

**Recent comparable sales**

- 🏠 Sold 08/20/2008: **\$280,000**  
[206 Chatsworth Dr](#)
- 🏠 Sold 09/18/2008: **\$258,000**  
[118 Winchester Way](#)
- 🏠 Sold 08/13/2008: **\$283,000**  
[162 Picadilly Pl](#)
- 🏠 Sold 10/23/2008: **\$305,000**  
[392 Glastonbury Ln](#)

▸ [See all comparable homes](#)

▸ [Refine Comparables](#)

### Mortgage Calculator

Loan Amount:

Interest Rate:

Repayment Period:

**Monthly Payment: \$1,613** [Recalculate](#)

Payment includes estimated taxes and insurance.

[Get custom quotes - anonymously](#)


### Home Ownership

This home has been claimed by owner.

[Flag listing](#)

### Home Q&A

Ask questions, share information [?](#) [See Q&A for other homes in the area](#)



Introduction

**Mashups**

Architecture  
Security in  
client-side services

OMOS

Experiments



[Introduction](#)

[Mashups](#)

[Architecture](#)

[Security in  
client-side services](#)

[OMOS](#)

[Experiments](#)

- ▷ What is a **Mashup** application?
- ▷ My favorite mashup website *Zillow!*
- ▷ **Web desktop** (webtop) (e.g. eyeOS, DesktopTwo, G.ho.st, Netvibes, and Online OS).

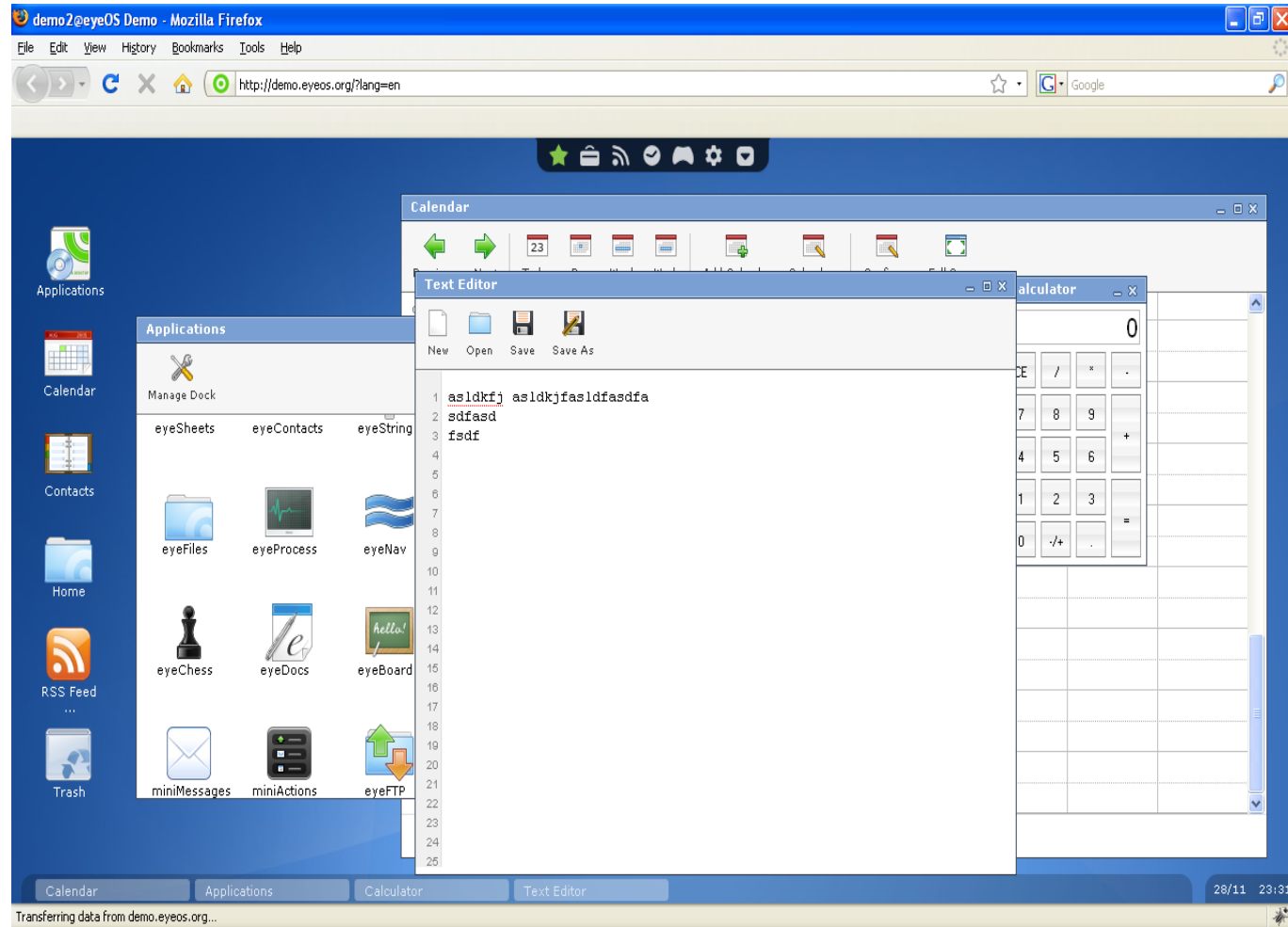
Introduction

Mashups

Architecture  
Security in  
client-side services

OMOS

Experiments



[Introduction](#)

[Mashups](#)

[Architecture](#)

[Security in  
client-side services](#)

[OMOS](#)

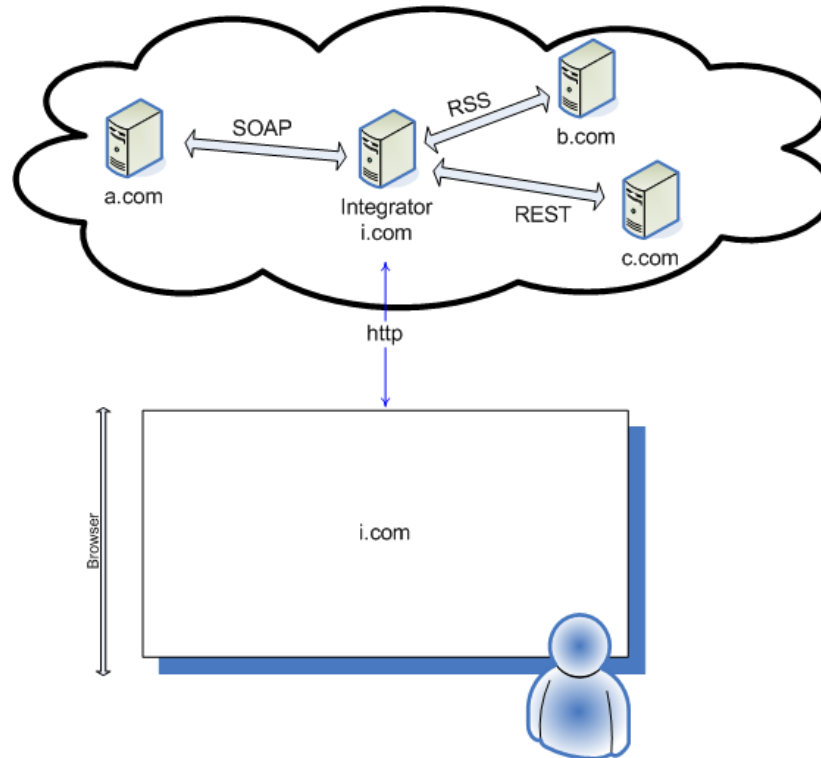
[Experiments](#)

Ways that service providers can expose their services:

▷ **Server-side services**

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[Introduction](#)

[Mashups](#)

[Architecture](#)

[Security in  
client-side services](#)

[OMOS](#)

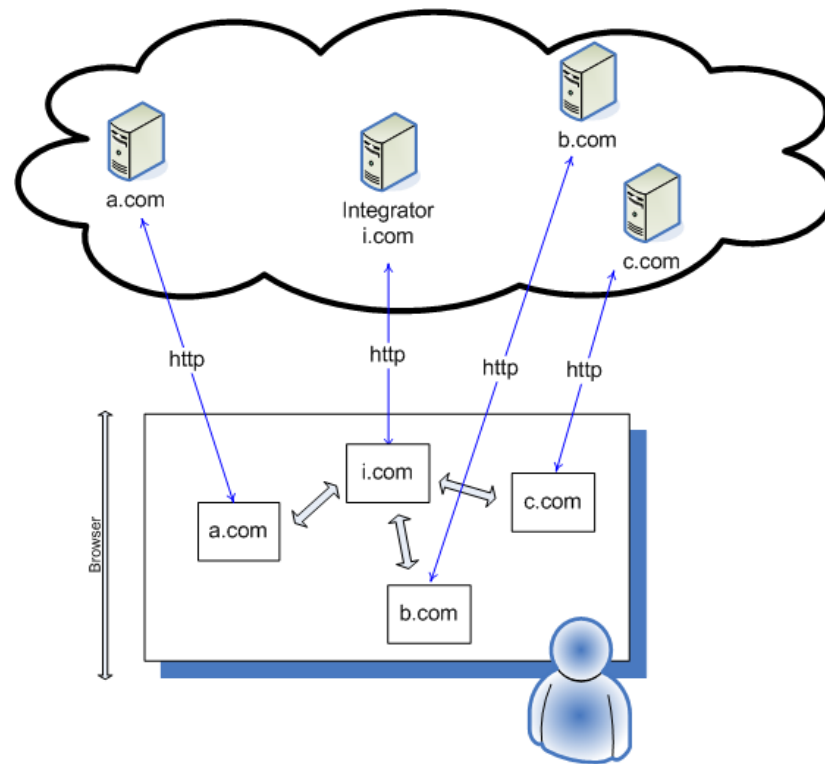
[Experiments](#)

Ways that service providers can expose their services:

- ▷ **Server-side services**
- ▷ **Client-side services**

Ways that service providers can expose their services:

- ▷ **Server-side services**
- ▷ **Client-side services**



User is involved; AJAX-oriented; More responsive/efficient

[Introduction](#)

[Mashups](#)

[Architecture](#)

[Security in  
client-side services](#)

[OMOS](#)

[Experiments](#)

- Service providers use **ad-hoc non-secure** methods.

[Introduction](#)

[Mashups](#)

[Architecture](#)

[Security in  
client-side services](#)

[OMOS](#)

[Experiments](#)

- Service providers use **ad-hoc non-secure** methods.
- Consumers need to *trust* service providers: Not suitable when dealing with sensitive personal data.

[Introduction](#)

[Mashups](#)

[Architecture](#)

[Security in  
client-side services](#)

[OMOS](#)

[Experiments](#)

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[Introduction](#)

[Mashups](#)

[Architecture](#)

[Security in  
client-side services](#)

[OMOS](#)

[Experiments](#)

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[Introduction](#)

[Mashups](#)

[Architecture](#)

[Security in  
client-side services](#)

[OMOS](#)

[Experiments](#)

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[Introduction](#)

[OMOS](#)

[Overview](#)

[Mashlet](#)

[Secure](#)

[Frame-to-frame](#)

[Communication](#)

[Communication](#)

[Stack](#)

[MDP Layer](#)

[MHTTP Layer](#)

[Experiments](#)

- **OpenMashupOS (OMOS)** is a mashup framework that is designed to support secure client-side services.

[Introduction](#)

[OMOS](#)

[Overview](#)

[Mashlet](#)

[Secure](#)

[Frame-to-frame](#)

[Communication](#)

[Communication](#)

[Stack](#)

[MDP Layer](#)

[MHTTP Layer](#)

[Experiments](#)

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Introduction

OMOS

**Overview**

Mashlet

Secure

Frame-to-frame

Communication

Communication

Stack

MDP Layer

MHTTP Layer

Experiments

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Introduction

OMOS

**Overview**

Mashlet

Secure

Frame-to-frame

Communication

Communication

Stack

MDP Layer

MHTTP Layer

Experiments

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Introduction

OMOS

**Overview**

Mashlet

Secure

Frame-to-frame

Communication

Communication

Stack

MDP Layer

MHTTP Layer

Experiments

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Introduction

OMOS

**Overview**

Mashlet

Secure

Frame-to-frame

Communication

Communication

Stack

MDP Layer

MHTTP Layer

Experiments

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[Introduction](#)

[OMOS](#)

[Overview](#)

[Mashlet](#)

[Secure](#)

[Frame-to-frame](#)

[Communication](#)

[Communication](#)

[Stack](#)

[MDP Layer](#)

[MHTTP Layer](#)

[Experiments](#)

- **Mashlet** is a client side component that runs in the browser under the privilege of the principal that is defined by the domain name of the server that hosts the mashlet.

[Introduction](#)

[OMOS](#)

[Overview](#)

[Mashlet](#)

[Secure](#)

[Frame-to-frame](#)

[Communication](#)

[Communication](#)

[Stack](#)

[MDP Layer](#)

[MHTTP Layer](#)

[Experiments](#)

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[Introduction](#)

[OMOS](#)

[Overview](#)

**[Mashlet](#)**

[Secure](#)

[Frame-to-frame](#)

[Communication](#)

[Communication](#)

[Stack](#)

[MDP Layer](#)

[MHTTP Layer](#)

[Experiments](#)

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[Introduction](#)

[OMOS](#)

[Overview](#)

[Mashlet](#)

[Secure](#)

[Frame-to-frame](#)

[Communication](#)

[Communication](#)

[Stack](#)

[MDP Layer](#)

[MHTTP Layer](#)

[Experiments](#)

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[Introduction](#)

[OMOS](#)

[Overview](#)

[Mashlet](#)

[Secure](#)

[Frame-to-frame](#)

[Communication](#)

[Communication](#)

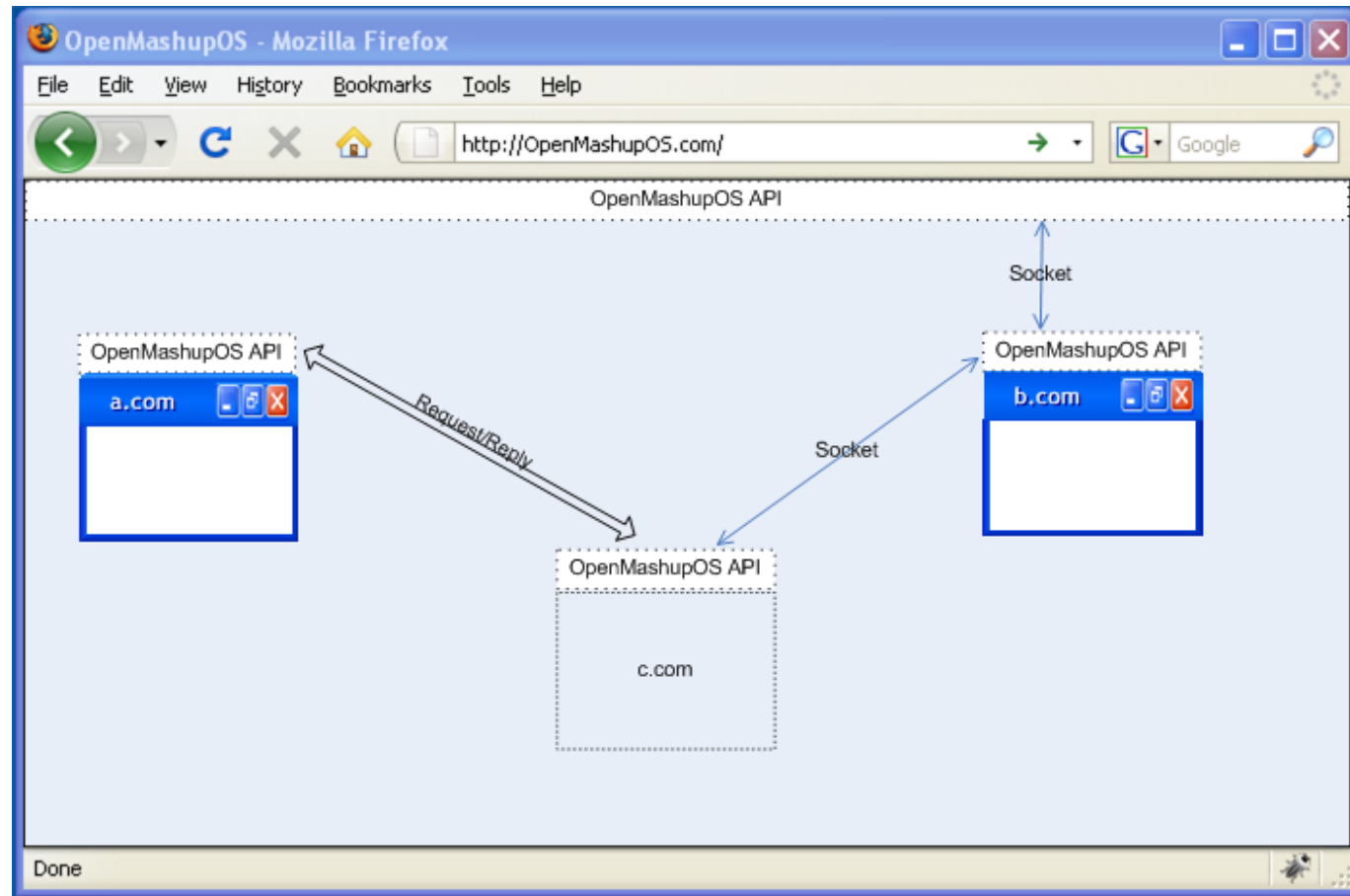
[Stack](#)

[MDP Layer](#)

[MHTTP Layer](#)

[Experiments](#)

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Using OMOS API, mashlets can communicate with their siblings and parents.

[Introduction](#)

[OMOS](#)

[Overview](#)

[Mashlet](#)

[Secure  
Frame-to-frame  
Communication](#)

[Communication](#)

[Stack](#)

[MDP Layer](#)

[MHTTP Layer](#)

[Experiments](#)

Security of OMOS communication protocol relies on *Same Origin Policy (SOP)*:

- Protects confidentiality of domains against each other. (DOM elements, events, cookies, ...)
- URL property of an iframe is write-only.
- Partial change of URL is not allowed.

# Secure Frame-to-frame Communication

[Introduction](#)

[OMOS](#)

[Overview](#)

[Mashlet](#)

[Secure](#)

[Frame-to-frame  
Communication](#)

[Communication](#)

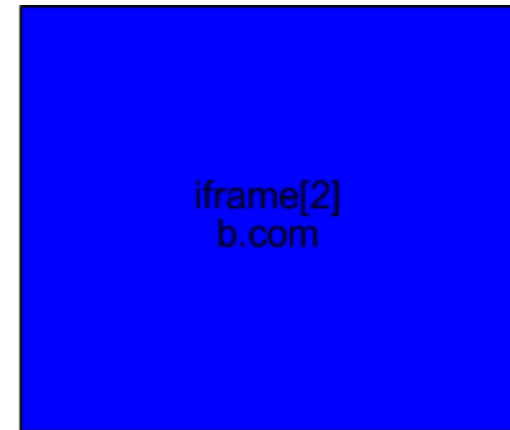
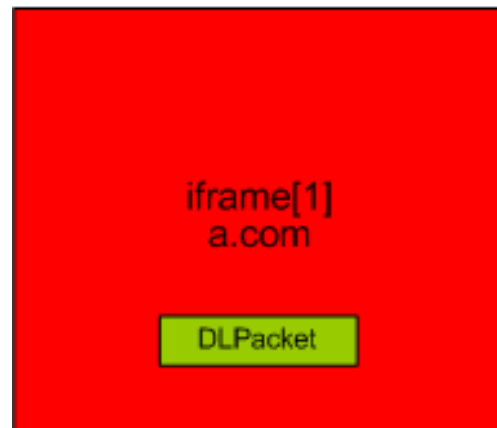
[Stack](#)

[MDP Layer](#)

[MHTTP Layer](#)

[Experiments](#)

Destination Frame Address	Source Frame Address	End point ID	Secret Key	Sequence Number	List of data fragments
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Introduction

OMOS

Overview

Mashlet

Secure

**Frame-to-frame  
Communication**

Communication

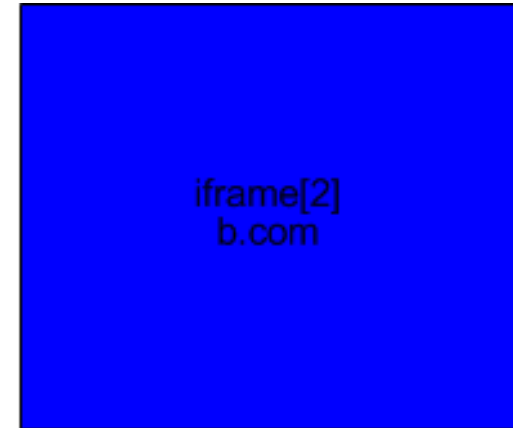
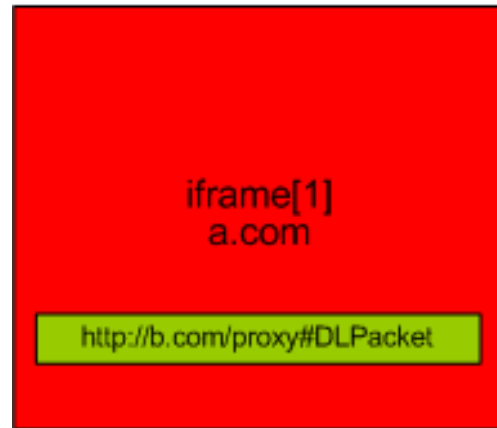
Stack

MDP Layer

MHTTP Layer

Experiments

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---------------------------	----------------------	--------------	------------	-----------------	------------------------



Introduction

OMOS

Overview

Mashlet

Secure

Frame-to-frame  
Communication

Communication

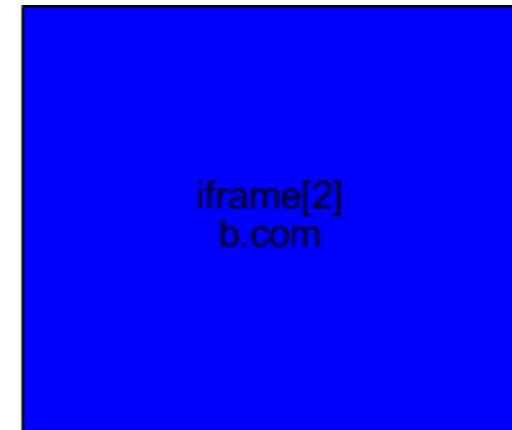
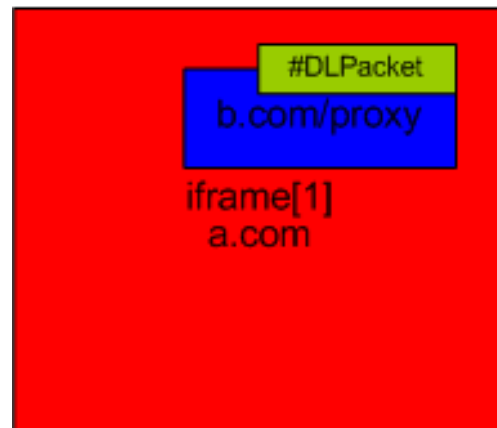
Stack

MDP Layer

MHTTP Layer

Experiments

Destination Frame Address	Source Frame Address	End point ID	Secret Key	Sequence Number	List of data fragments
---------------------------	----------------------	--------------	------------	-----------------	------------------------



Introduction

OMOS

Overview

Mashlet

Secure

Frame-to-frame  
Communication

Communication

Stack

MDP Layer

MHTTP Layer

Experiments

Destination Frame Address	Source Frame Address	End point ID	Secret Key	Sequence Number	List of data fragments
---------------------------	----------------------	--------------	------------	-----------------	------------------------



Introduction

OMOS

Overview

Mashlet

Secure

Frame-to-frame  
Communication

Communication

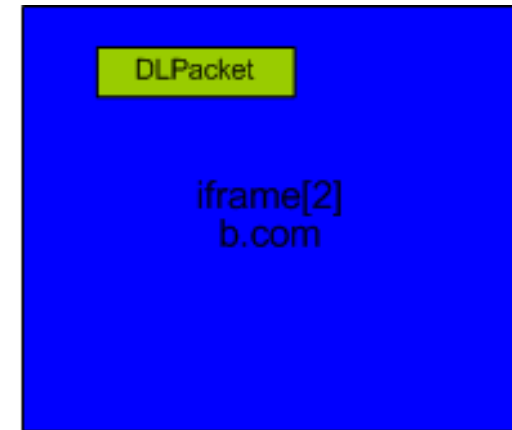
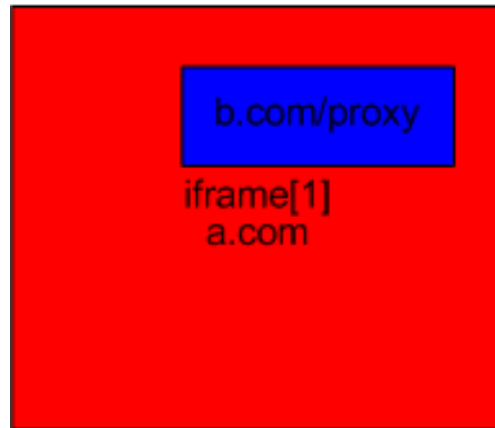
Stack

MDP Layer

MHTTP Layer

Experiments

Destination Frame Address	Source Frame Address	End point ID	Secret Key	Sequence Number	List of data fragments
---------------------------	----------------------	--------------	------------	-----------------	------------------------



# Secure Frame-to-frame Communication

Introduction

OMOS

Overview

Mashlet

Secure

Frame-to-frame  
Communication

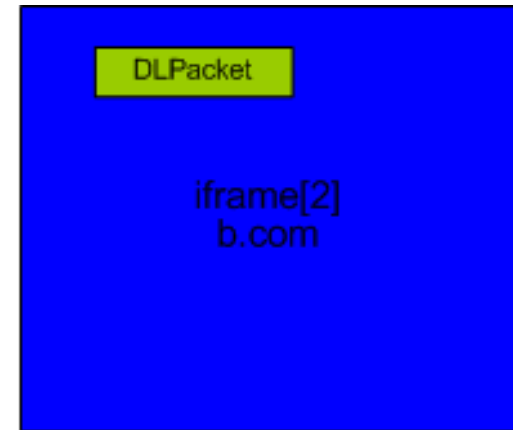
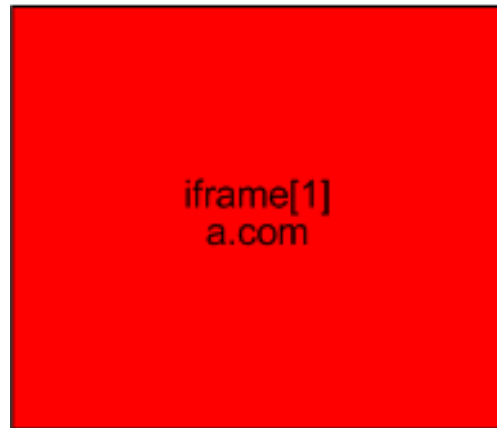
Communication  
Stack

MDP Layer

MHTTP Layer

Experiments

Destination Frame Address	Source Frame Address	End point ID	Secret Key	Sequence Number	List of data fragments
---------------------------	----------------------	--------------	------------	-----------------	------------------------



Introduction

OMOS

Overview

Mashlet

Secure

Frame-to-frame  
Communication

Communication

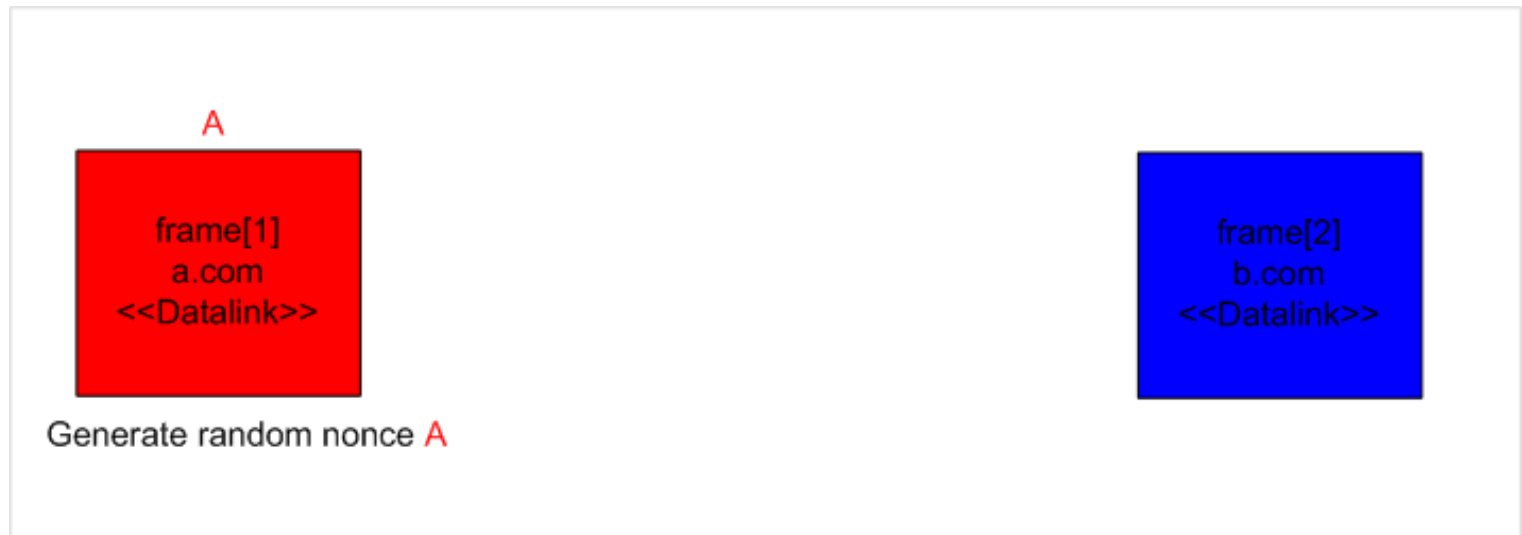
Stack

MDP Layer

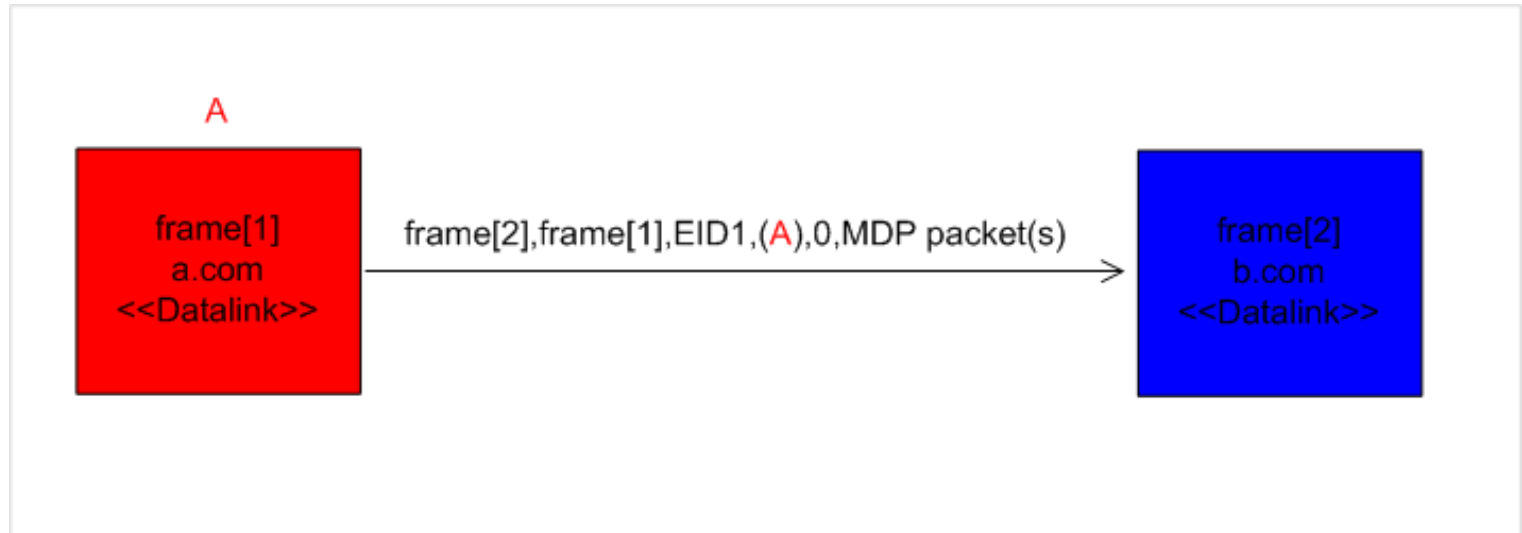
MHTTP Layer

Experiments

## Key exchange protocol:



## Key exchange protocol:



Introduction

OMOS

Overview

Mashlet

Secure

Frame-to-frame  
Communication

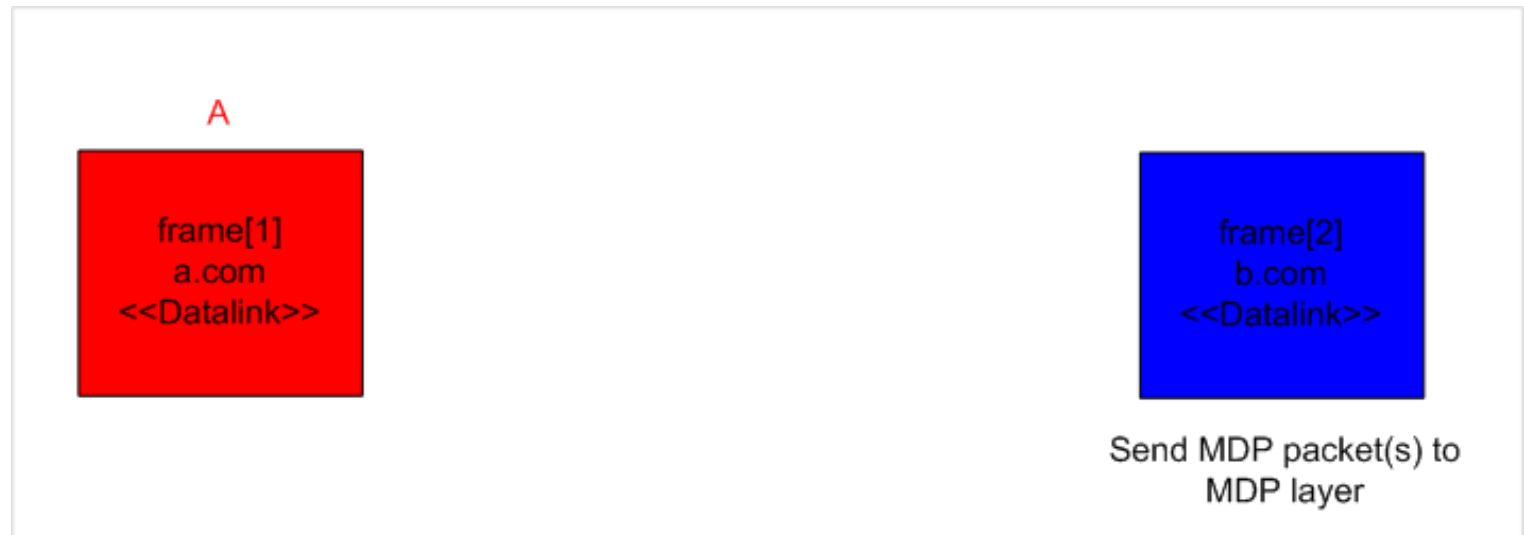
Communication  
Stack

MDP Layer

MHTTP Layer

Experiments

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Introduction

OMOS

Overview

Mashlet

Secure

Frame-to-frame  
Communication

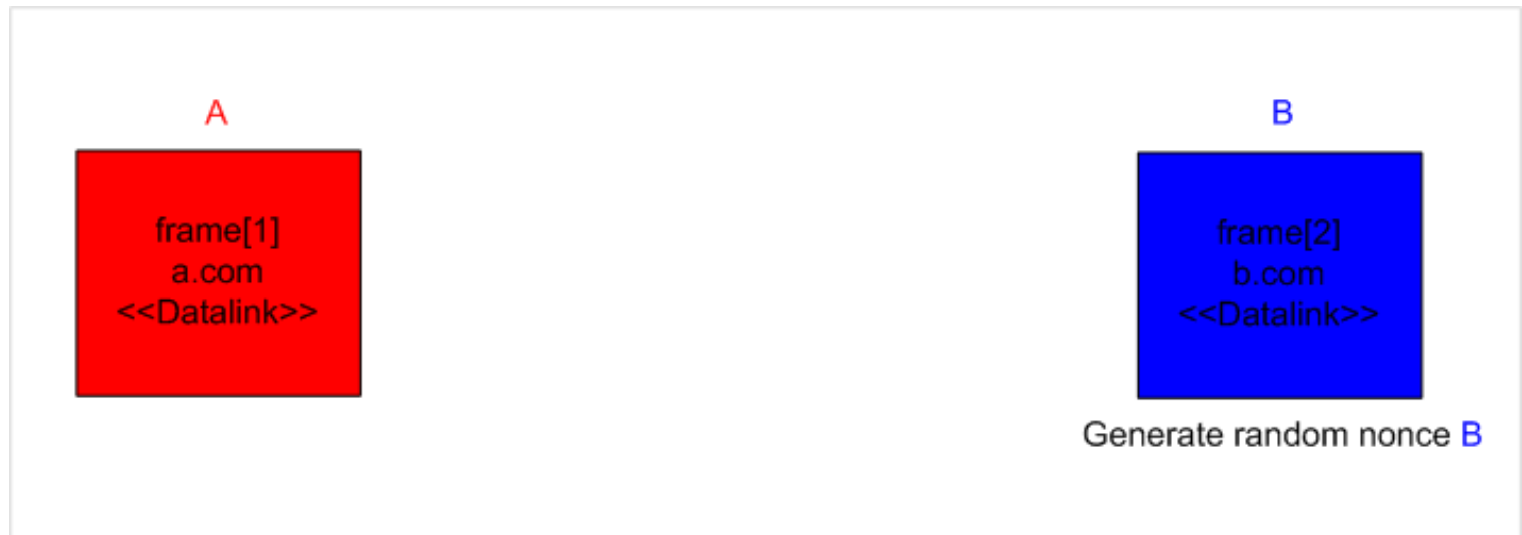
Communication  
Stack

MDP Layer

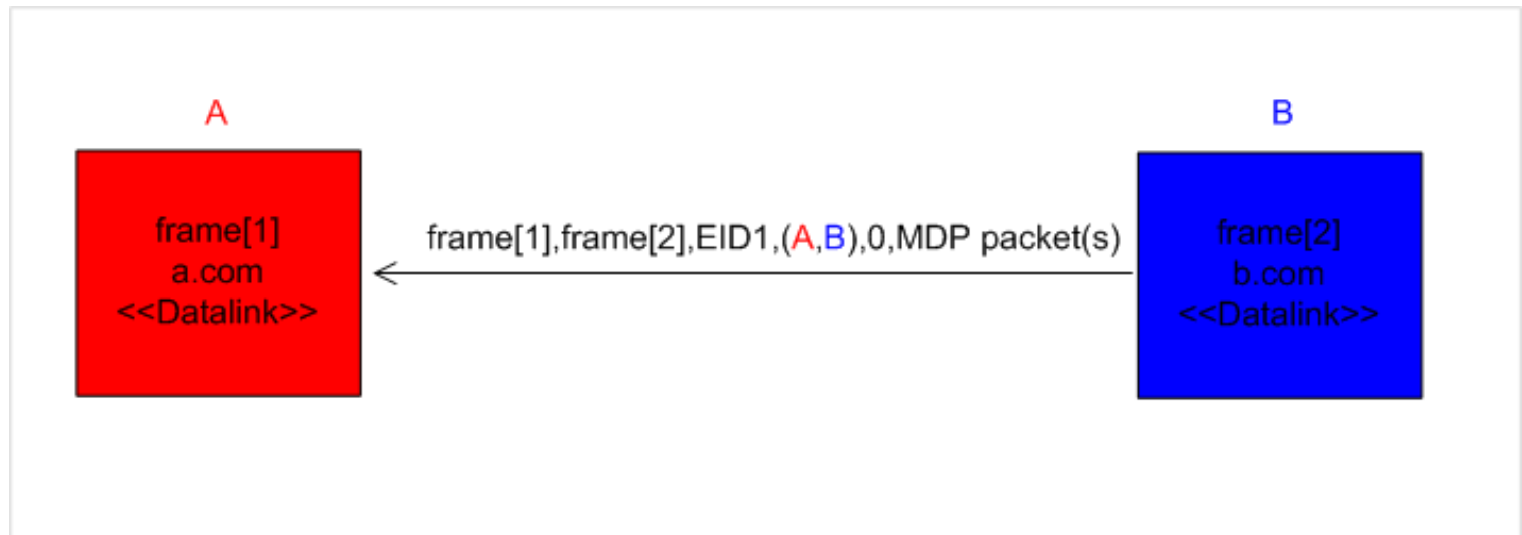
MHTTP Layer

Experiments

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Introduction

OMOS

Overview

Mashlet

Secure

Frame-to-frame  
Communication

Communication

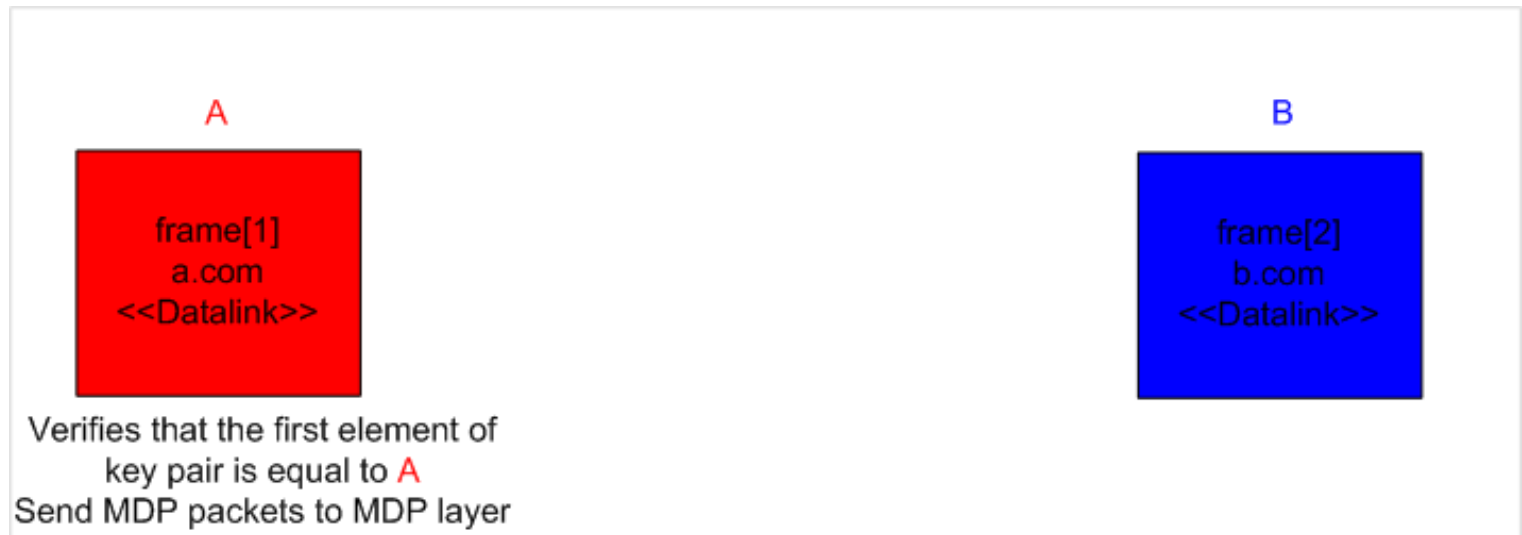
Stack

MDP Layer

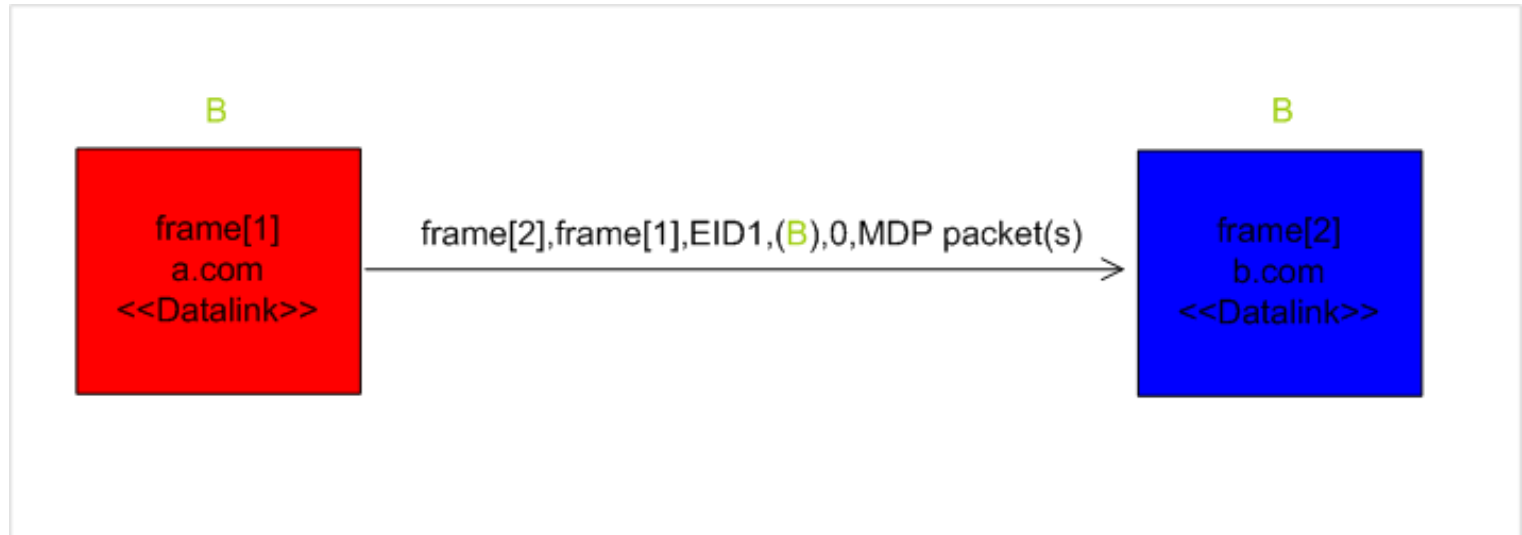
MHTTP Layer

Experiments

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Introduction

OMOS

Overview

Mashlet

Secure

Frame-to-frame

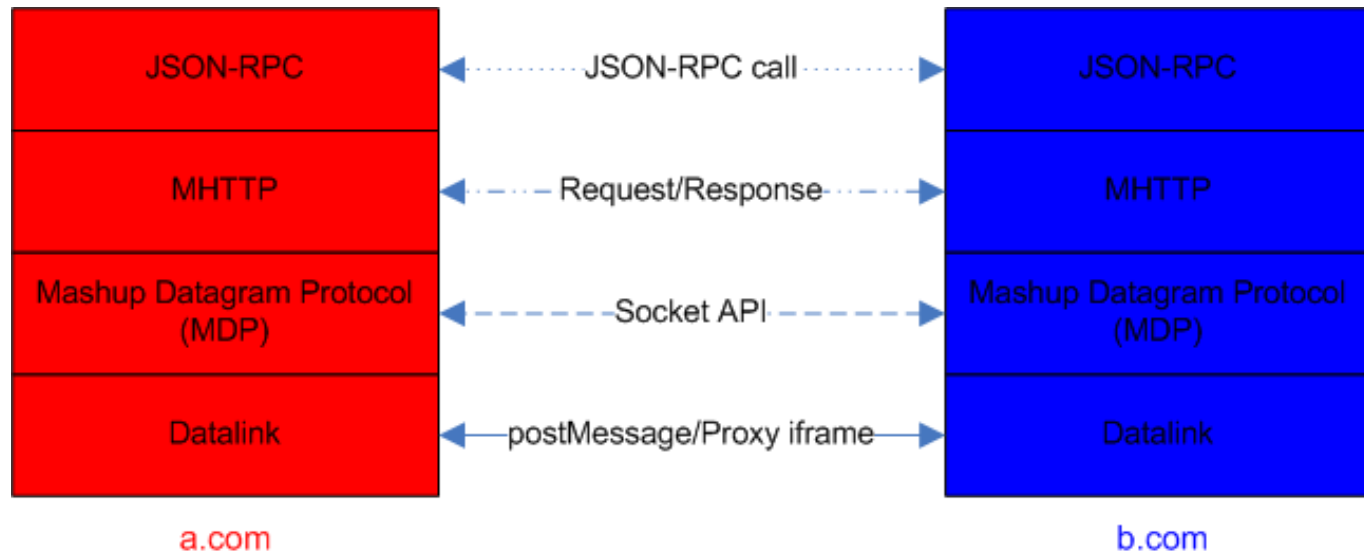
Communication

Communication Stack

MDP Layer

MHTTP Layer

Experiments



Each layer hides complex implementation details of communication in lower layers.

[Introduction](#)

[OMOS](#)

[Overview](#)

[Mashlet](#)

[Secure](#)

[Frame-to-frame](#)

[Communication](#)

[Communication](#)

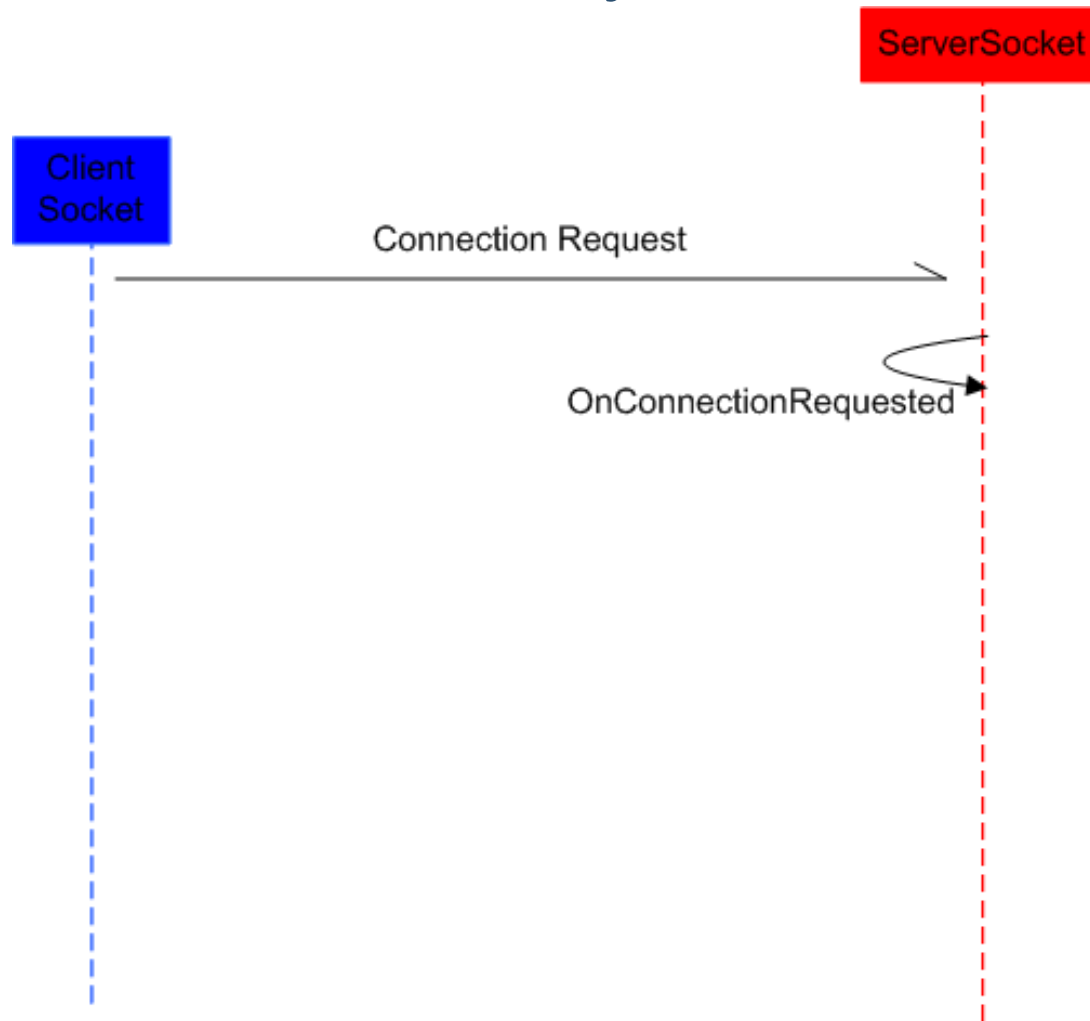
[Stack](#)

**[MDP Layer](#)**

[MHTTP Layer](#)

[Experiments](#)

## 3-way Handshake



[Introduction](#)

[OMOS](#)

[Overview](#)

[Mashlet](#)

[Secure](#)

[Frame-to-frame](#)

[Communication](#)

[Communication](#)

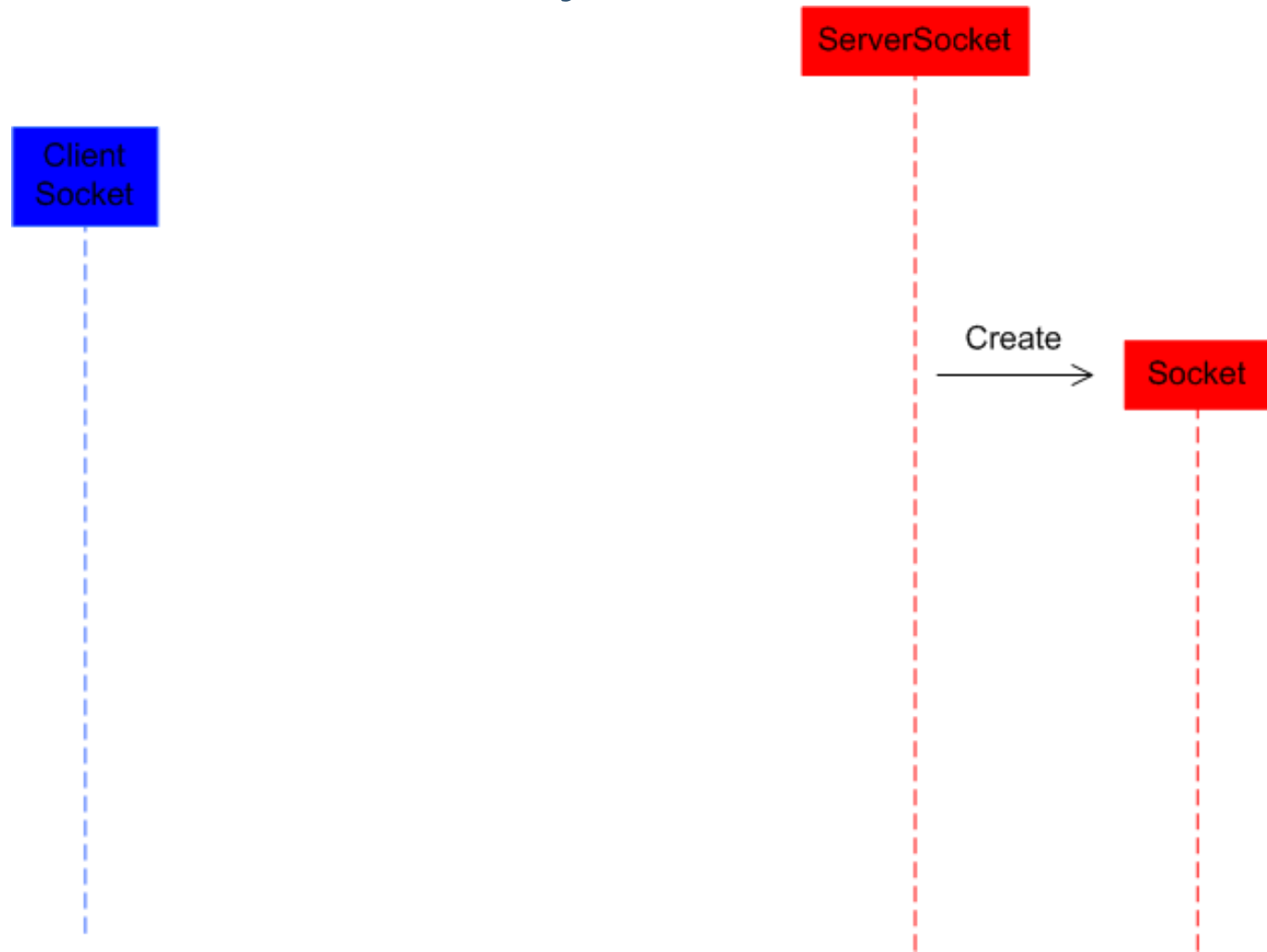
[Stack](#)

[MDP Layer](#)

[MHTTP Layer](#)

[Experiments](#)

## 3-way Handshake



[Introduction](#)

[OMOS](#)

[Overview](#)

[Mashlet](#)

[Secure](#)

[Frame-to-frame](#)

[Communication](#)

[Communication](#)

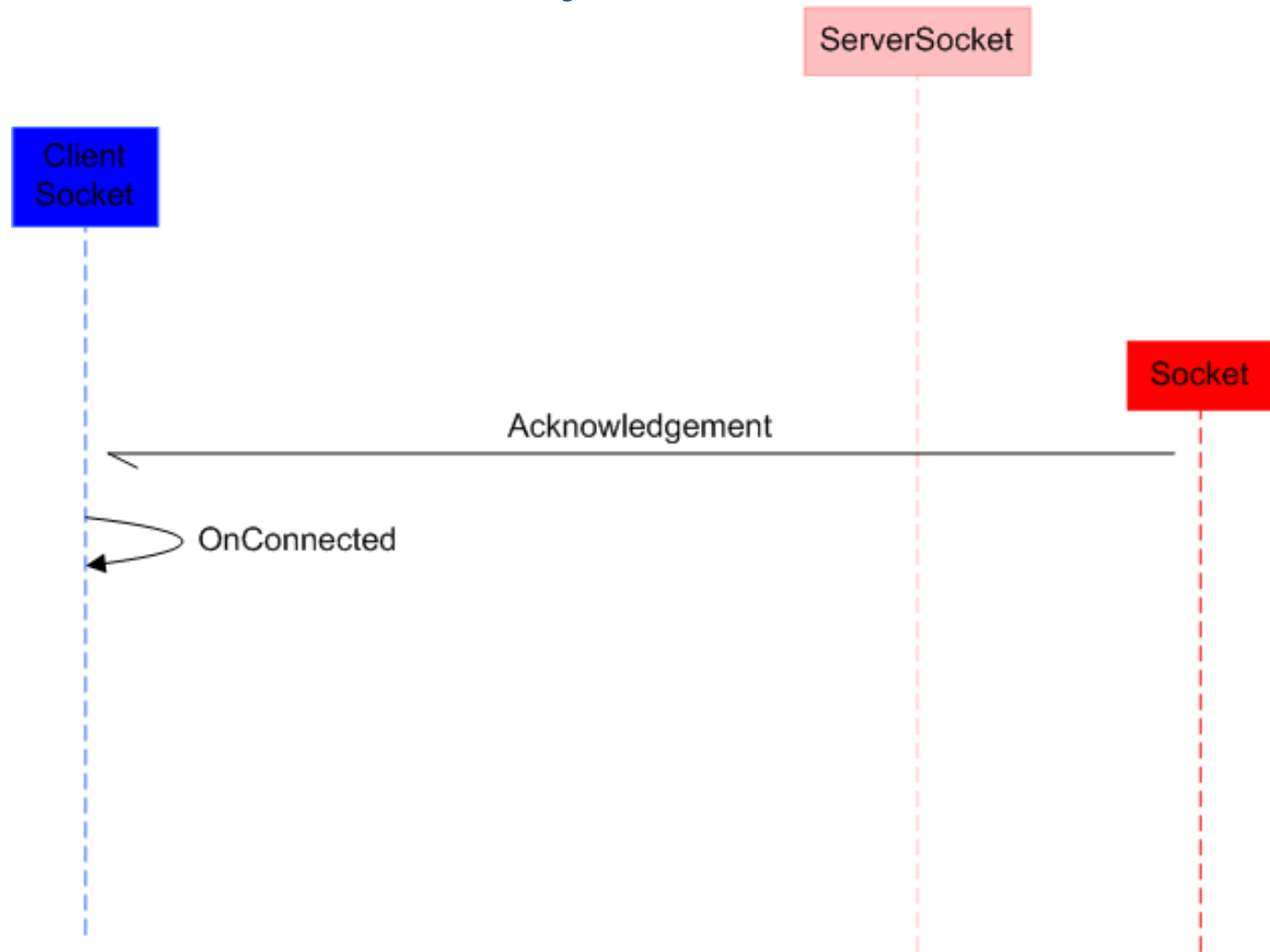
[Stack](#)

**[MDP Layer](#)**

[MHTTP Layer](#)

[Experiments](#)

## 3-way Handshake



[Introduction](#)

[OMOS](#)

[Overview](#)

[Mashlet](#)

[Secure](#)

[Frame-to-frame](#)

[Communication](#)

[Communication](#)

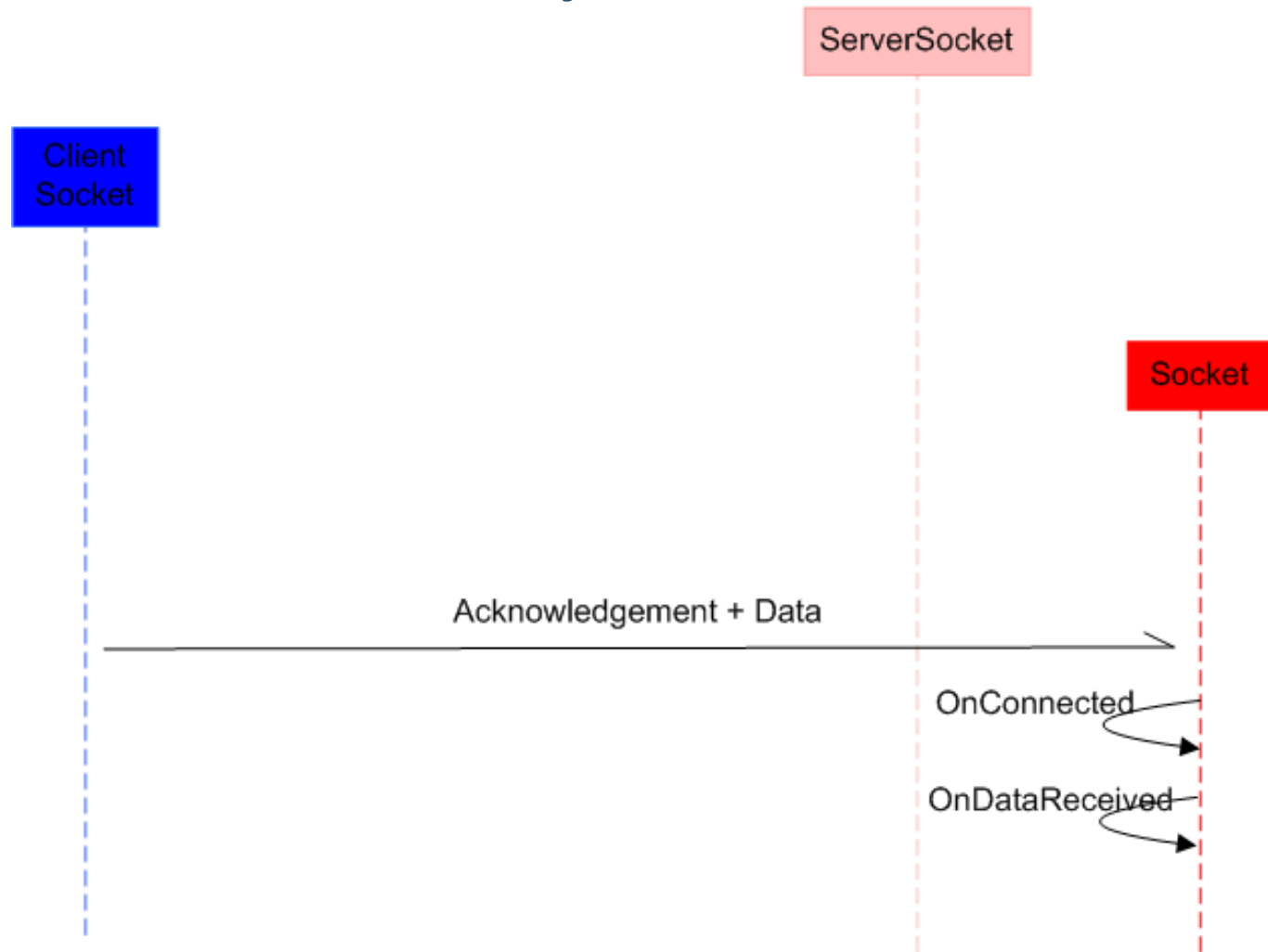
[Stack](#)

[MDP Layer](#)

[MHTTP Layer](#)

[Experiments](#)

## 3-way Handshake



[Introduction](#)

[OMOS](#)

[Overview](#)

[Mashlet](#)

[Secure](#)

[Frame-to-frame](#)

[Communication](#)

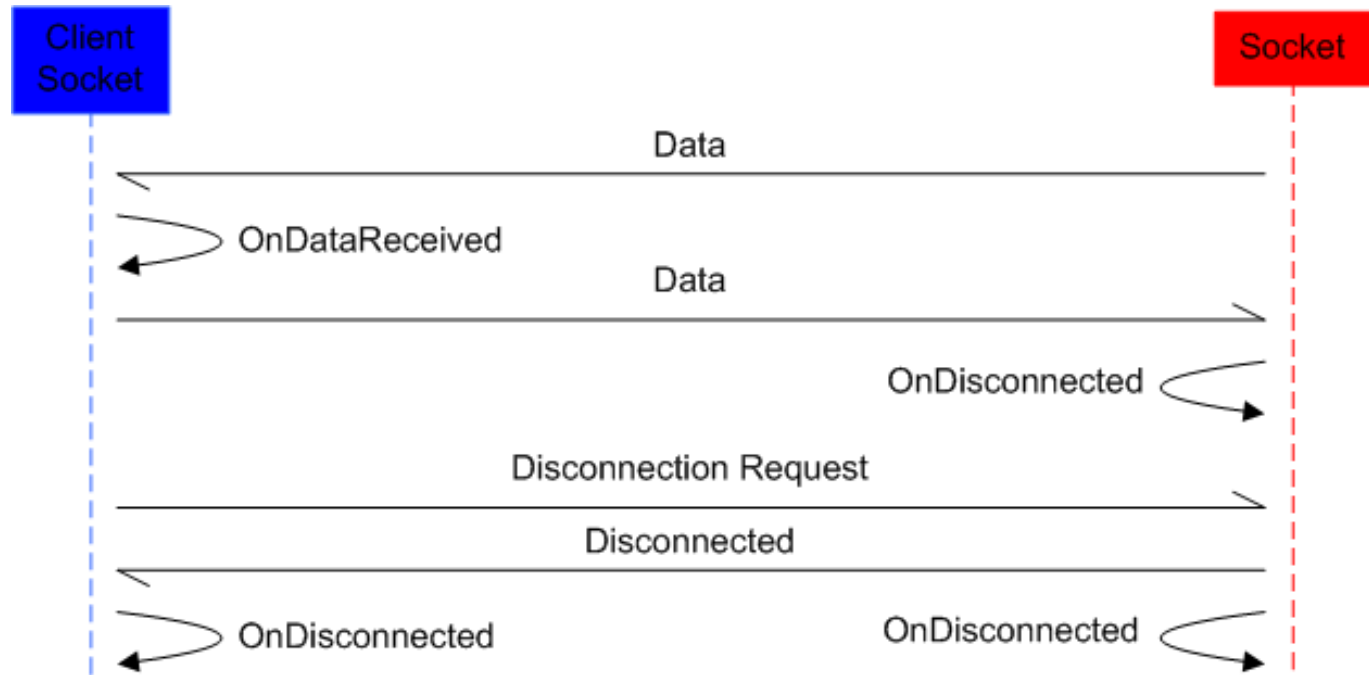
[Communication](#)

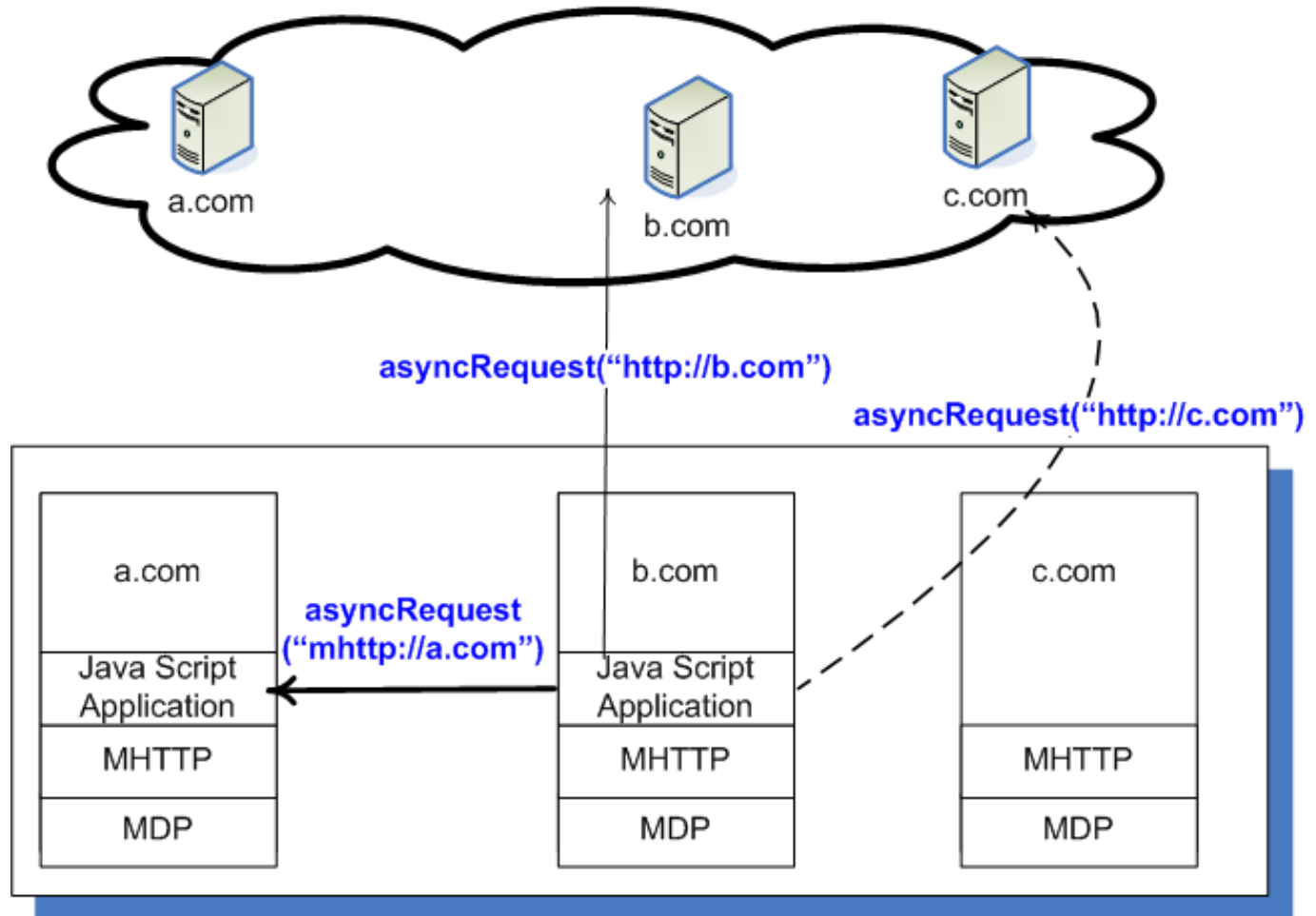
[Stack](#)

**[MDP Layer](#)**

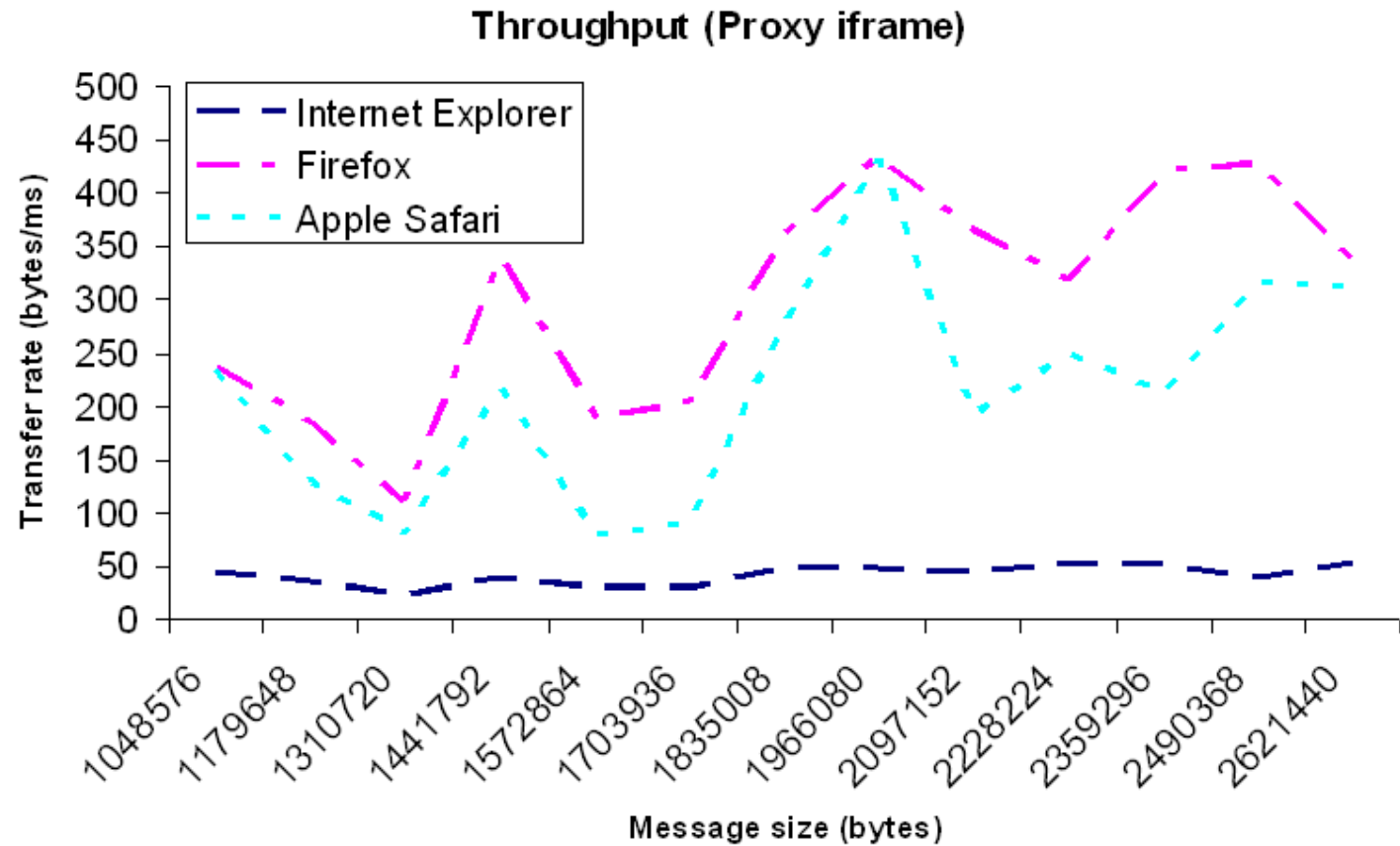
[MHTTP Layer](#)

[Experiments](#)





Versatile `asyncRequest`: mashlet-to-mashlet, same-domain & cross-domain mashlet-to-server communication.



### Throughput (postMessage/Opera)

