

# Characteristic-Based Security Analysis of Personal Networks



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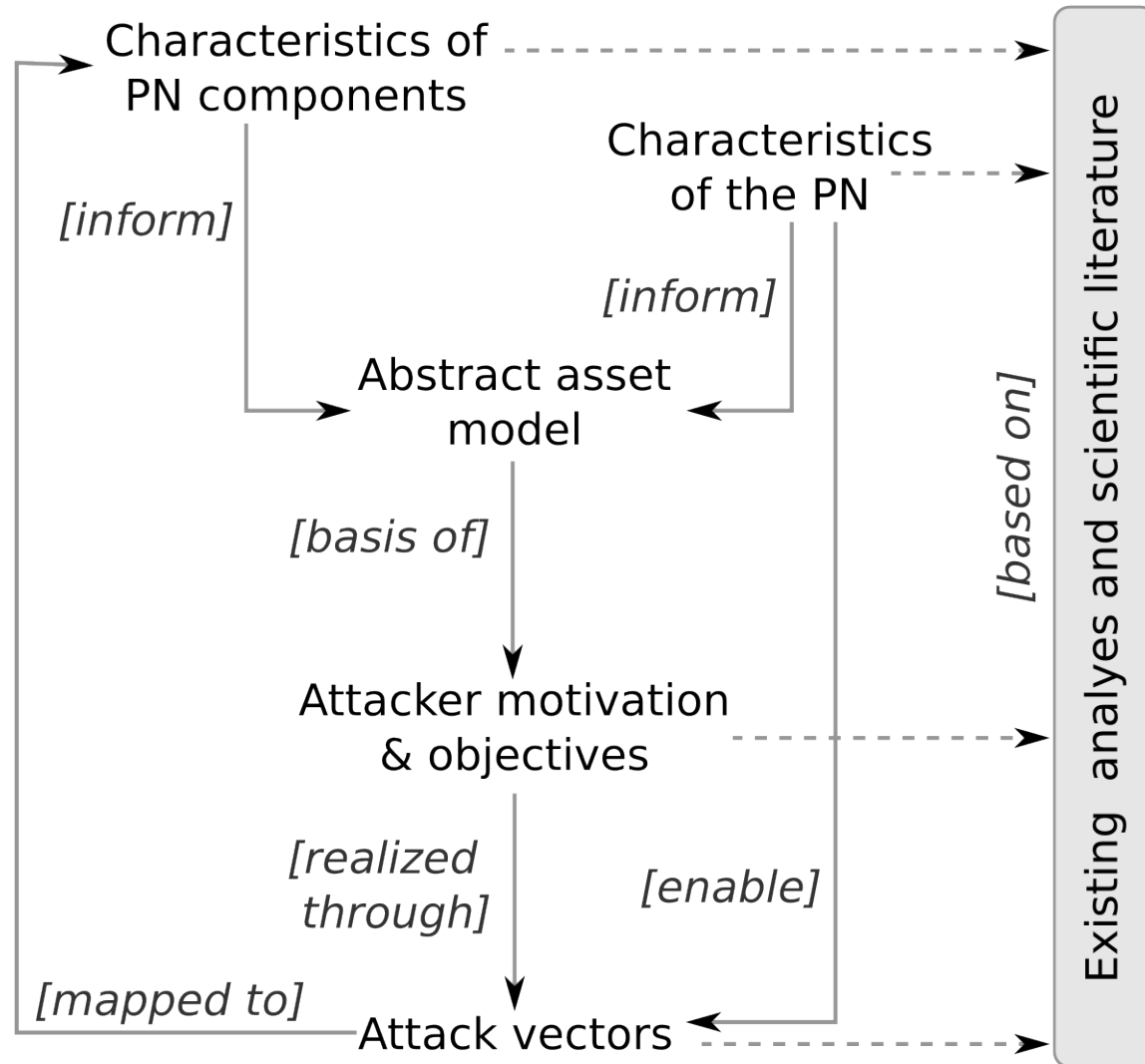
# Home Network Security

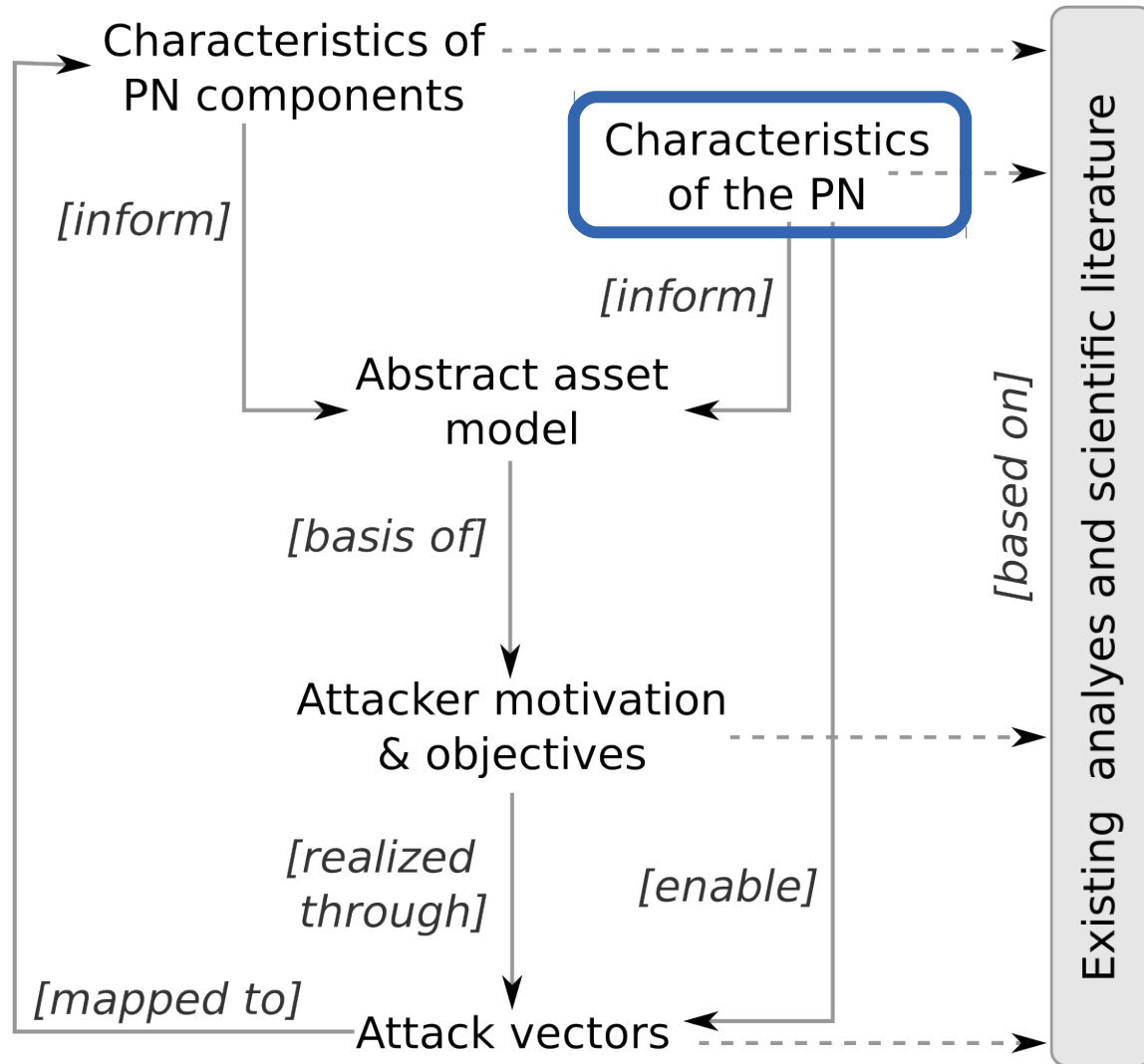
- Limitations of previous analyses
  - geographically-defined networks
  - category-based approaches
- Focus on Personal Network (PN)
  - home network + PAN + VAN + cloud
  - more representative of current systems
  - captures emergent characteristics
- Characteristic-based approach
  - maps device characteristics to attack vectors
  - more descriptive than category-based approaches
  - can adapt as technology changes

# The Personal Network

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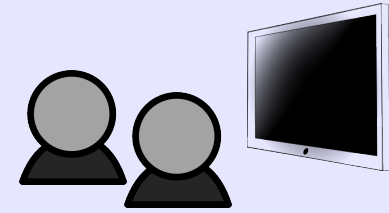
# Characteristic-Based Security Analysis



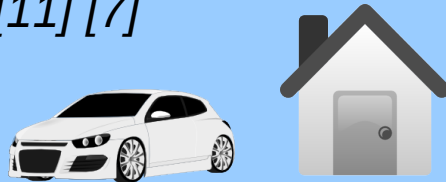


# PN Characteristics

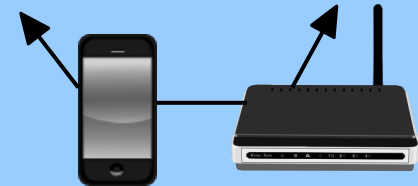
Shared components  
*[10] [7]*



Absence of geographical  
locality *[10] [11] [7]*



Multihomed network topology  
*[3]*



Device heterogeneity  
*[3] [12] [9]*



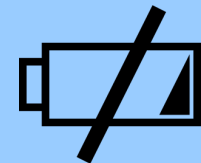
Dynamic membership  
*[15]*

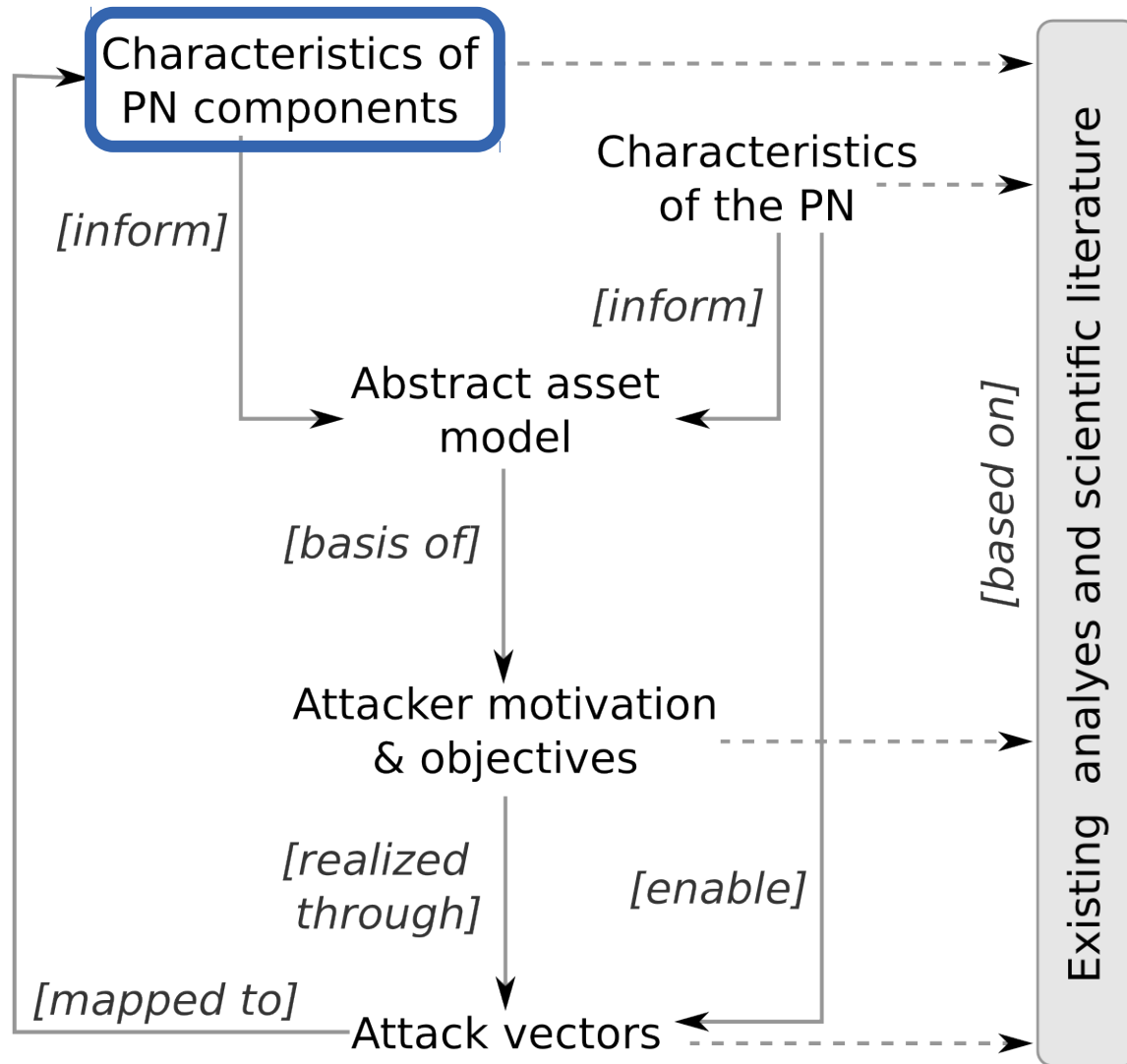


Communication diversity  
*[3] [10] [15]*

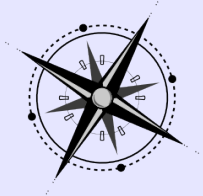

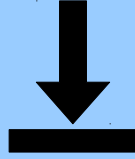
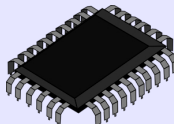

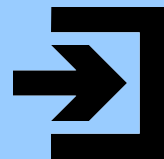




Energy-aware systems  
*[14]*





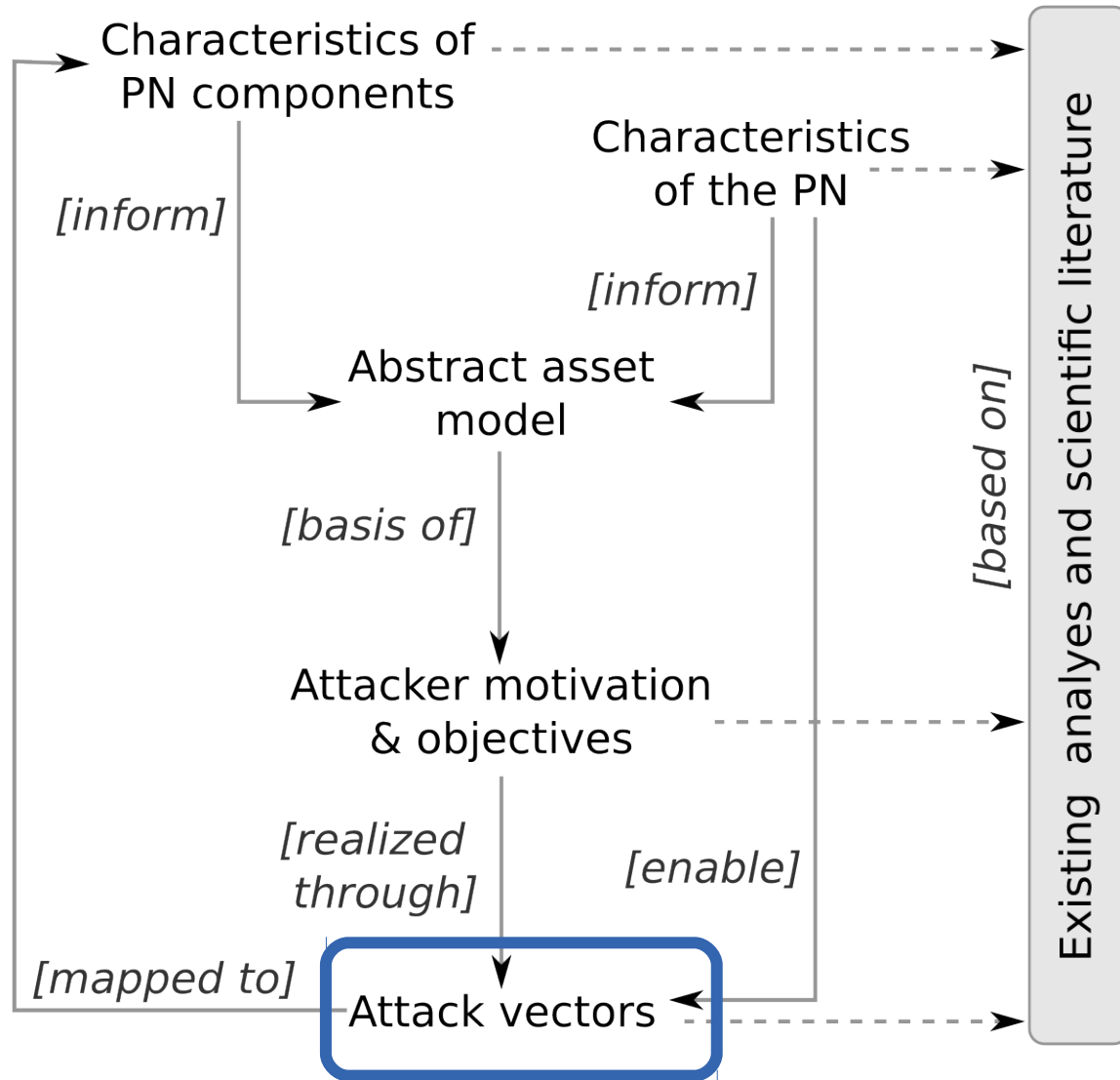
# Component Characteristics

		Physical mobility	
Persistent storage		Support for third party software	
Processing functionality		Control of other components	
Communication capabilities		Remote accessibility	
User interface capabilities		Provision of services	
Control of physical infrastructure		Consumption of services	



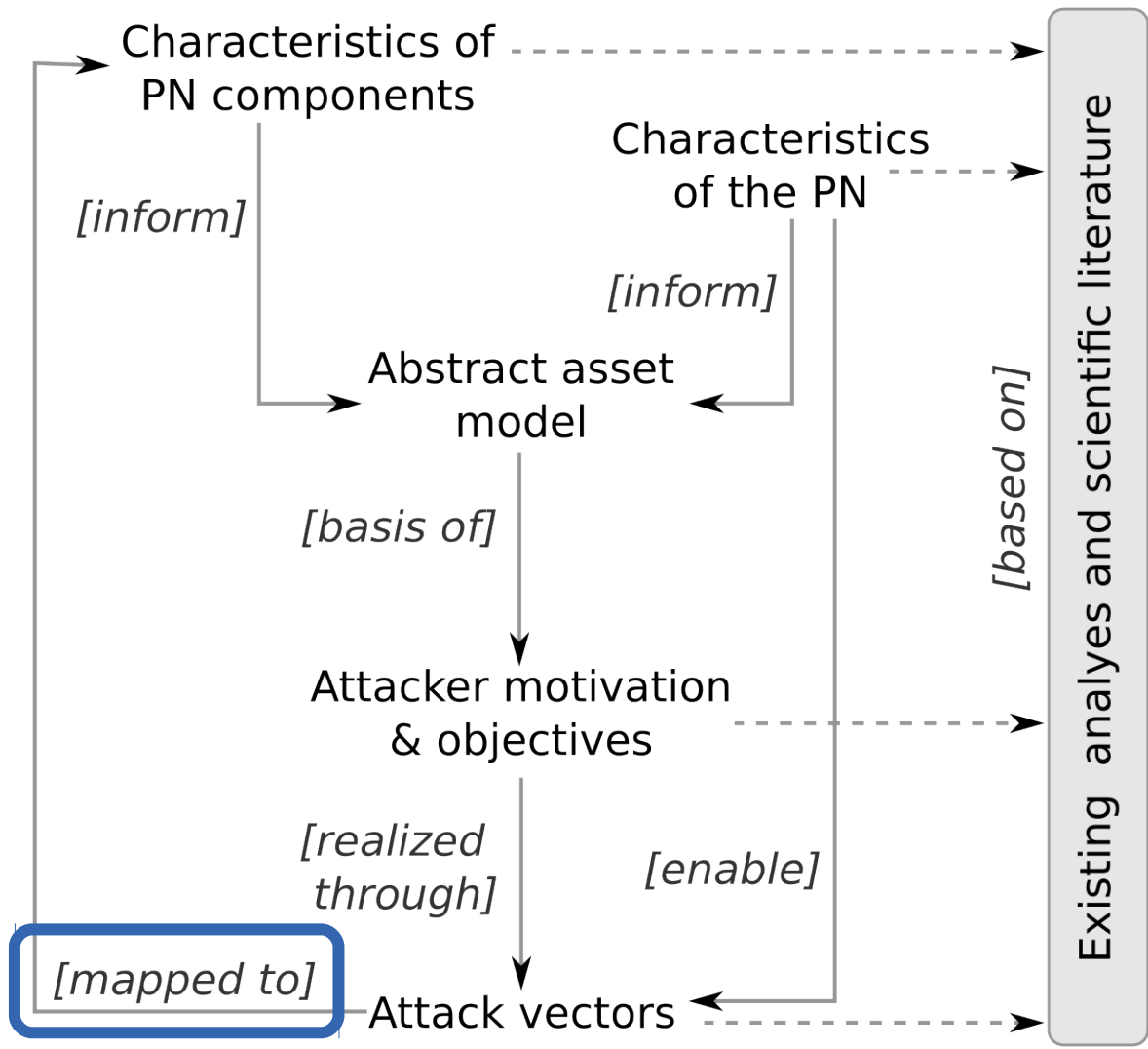
# Component Characteristics

	Tablet	HEMS			
			Physical mobility	✓	✗
Persistent storage	✓	✓	Support for third party software	✓	✗
Processing functionality	✓	✓	Control of other components	✓	✗
Communication capabilities	✓	✓	Remote accessibility	✗	✓
User interface capabilities	✓	✗	Provision of services	✗	✓
Control of physical infrastructure	✗	✓	Consumption of services	✓	✗



# Attack Vectors

Malicious software <i>[1][4][7][8][9]</i>	Impersonating a communicating entity <i>[3]</i>
Malicious hardware <i>[16]</i>	Unauthorized remote access <i>[3][7][9]</i>
Software exploits <i>[8]</i>	Unauthorized physical access <i>[3][7]</i>
Hardware exploits <i>[16]</i>	Misuse of device interoperability <i>[7]</i>
Interception of communication (eavesdropping) <i>[1][2][3][4]</i>	Protocols exploits <i>[1]</i>
Interruption of communication <i>[3][16]</i>	Eavesdropping on the UI (shoulder-surfing) <i>[3]</i>
Modification of communication <i>[3]</i>	Modification of communication routing <i>[1][3]</i>





# Conclusion

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